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### STEAMBOAT INSPECTION RULES

The board of supervising inspectors of the steamboat service completed its revision of the steamboat rules and regulations this week and they have been approved by the secretary of commerce and labor. The result has been reached after exhaustive hearings before the secretary, in which leading representatives of various maritime and shipping interests appeared to oppose a draft of the present regulations. The objection of the shipping interests was concentrated in particular on change in the bulkhead rule, on the proposed additional requirements for donkey-boilers, on the new requirements for complement of crews and licensed officers, and on the general retroactive effect of many of the new provisions. Believing these objections to be reasonable the board has stricken out the new requirement as to bulkheads and donkey-boilers.

As to the crew complement, the new requirements were stricken out and the number of officers and crew is left to be determined by the local inspectors, subject to an appeal to the secretary. Amendments were made that substantially remove all retroactive effects of any of the new rules, so that, with few exceptions, the equipment and construction which has met the requirements of law and of rules now in force, will not have to be changed and the new provisions apply only to new conditions. The secretary in making the rules public said:

"Acting upon the lessons taught by the Slocum disaster, and upon the vast amount of information afforded by the shipping and maritime interests, the department has adopted these rules as a means of greatly increasing the safety of passengers, and at the same time, meeting the necessary and proper restrictions imposed by commercial conditions."

The rules have been changed in the following particular:

**Boiler Plates.**—The maximum tensile strength allowed for steam boiler plates when exposed to fire has been reduced from 75,000 to 70,000 on boilers hereafter constructed. Provision has been made for modern and improved methods of flanging copper pipes. The requirement of safety collars and stop bolts in slip joints has been removed.

**Boats, Rafts, Bulkheads and Life Saving Appliances.**—Provides for details of construction of metallic lifeboats and life rafts, and for the filing by makers thereof of drawings and specifications with the board of supervising inspectors, changes slightly the rule of measuring boat capacity; requires metal air tanks in lifeboats; slight increase of required boat capacity on river passenger steamers; prohibits use of loose granulated cork in life rafts and life preservers, and of kapok life preservers after May 1, 1905; provides in detail for the methods of construction and inspection of life preservers; leaves the method of stowing or suspending life preservers in the dis-

cretion of the local inspectors subject to the general provision as to ready accessibility and distribution of the same.

**Fire Apparatus.**—Requires all passenger steamers, instead of inland steamers only, to be provided with fire buckets, barrels and axes, requires lamp lockers, oil rooms, and like compartments to be provided with steam fire branches and lined with metal; allows the use of carbonic acid gas or other extinguishing gases or vapors in place of steam fire branches for extinguishing fire in such compartments; pumps to be filled with relief valve to lift at 100 lbs. pressure; all hose connections after March 31, 1905, shall be of United States standard pipe thread; requires portable fire extinguishers according to tonnage on passenger steamers; steam siphons may be substituted for bilge pipes; requires all fire hose to be tested by inspectors to a pressure of 100 lbs. to the square inch, and that one length of such hose shall be kept attached to each outlet of the fire main; requires fire mains on all decks, with a sufficient number of outlets arranged so that any part of the steamer can be reached by means of a single length of hose from at least one of the said outlets.

**Licensed Officers.**—Adds stringent and detailed requirements as to the discipline of crews and fire and boat drills, and obliges inspectors to assure themselves by frequent observation that such drills are performed.

**Inspection of Steamers.**—Increases from thirty to sixty days the time within which a vessel may be inspected anterior to the expiration of her certificate.

**Ferryboats.**—Requires ferryboats to be equipped with life preservers proportioned to the number of square feet of passenger deck surface; additional requirements as to watertight bulkheads.

**Excursion Steamers.**—Requires barges carrying passengers to have a master and not less than two deck hands for every 500 passengers. Also, a life preserver for every passenger carried.

**Duties of Inspectors.**—Reduces required joint inspection by both hull and boiler inspectors to hydrostatic pressure, pumps, hose and other fire apparatus; requires inspectors to test fire hose with a pressure of 100 lbs. to the square inch.

**Miscellaneous.**—Omits the old lead-line requirements and table as to depth of hold and freeboard and conditions thereof when loaded; prohibits flashing of searchlight in a pilot house of a passing vessel. Specifies size of fog bell.

The McMyler Manufacturing Co. of Cleveland is installing a 15-ton crane at the quarries of the Kelley Island Lime & Transport Co. on Kelley Island and also a machine for handling sand for the same company at Sandusky.



OFFICERS, MEMBERS AND GUESTS AT ANNUAL MEETING OF MARINE ENGINEERS' BENEFICIAL ASSOCIATION, WASHINGTON, D. C., JANUARY 21, 1905.

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25. Willard A. Mondy, No. 43, Port Huron, Mich.
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31. Art Hyde, No. 2, Cleveland, O.
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40. J. I. Givnan, No. 33, New York, N. Y.
41. J. W. Armour, "Power," New York, N. Y.
42. F. R. Low, "Power," New York, N. Y.
43. Andrew A. Manion, No. 53, Marine City, Mich.
44. Joseph K. Cotton, No. 101, Norfolk, Va.
45. Robert B. Dick, No. 13, Philadelphia, Pa.
46. Joseph Brooks, No. 13, Philadelphia, Pa.

47. Joseph Brady, No. 5, Baltimore, Md.
48. Andrew G. Haig, No. 91, Ashtabula, O.
49. John P. Murphy, No. 62, New London, Conn.
50. Thomas G. Williams, No. 101, Norfolk, Va.
51. F. J. Wheeler, No. 33, New York, N. Y.
52. Mr. Richardson.
53. N. S. Kenny, Phillip Carey Mfg. Co.
54. Herbert E. Stone, P. N. P. of N. A. S. E.
55. H. S. Colding, No. 45, Savannah, Ga.
56. S. J. Bowling, Phillip Carey Mfg. Co.
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69. Edwin P. Groff, No. 13, Philadelphia, Pa.
70. John H. Lowery, No. 55, Cheboygan, Mich.

### BATTLE OF THE BOILERS

The battle of the boilers is by no means at an end. Discussion has been aroused afresh by the report of the French parliamentary commission, which once more gives voice to the general opinion of naval engineers that the Belleville boiler has been too hastily condemned. The first-class cruiser *Drake*, for instance, has just made a run from Gibraltar to Portsmouth, and for eight hours she maintained a continuous speed of 24.16 knots, more than a knot above her contract speed. Her steam is entirely supplied by Bellevilles. It is only a question of manufacture and management. As regards the former, it is generally agreed that the early Bellevilles constructed in Britain were of an inferior type to those made in France, where the Belleville was invented and first used; and as regards the latter, the Belleville, like the two types which have displaced it, requires the services of intelligent and skilled mechanics to keep them in proper order. Engineers of all countries acknowledge that the quality of the personnel is of

more importance than the quantity. The water-tube boiler, said the boiler board of the United States navy, calls for more brain work, and at the same time less physical effort on the part of the firemen. To get this quality of fireman he will have to be specially trained. The British admiralty have only lately realized this, and the result of teaching the stokers to use their brains as well as their muscles is shown in the fine performances of the *Drake*. It must be allowed that the engineers who use the boilers should know most about them, and they invariably express satisfaction with the Belleville. In coal consumption this much and unjustly abused type occupies a premier place—even its detractors admit as much. The excess in coal consumption occurred before economizers were used, but today it is claimed that if 100 tons of coal will carry a Belleville ship 130 miles at a certain speed, the same amount of coal will carry the same ship at the same speed only about 115 miles with other boilers, and but 100 miles with some boilers. The importance of coal economy can never be too strongly insisted upon.

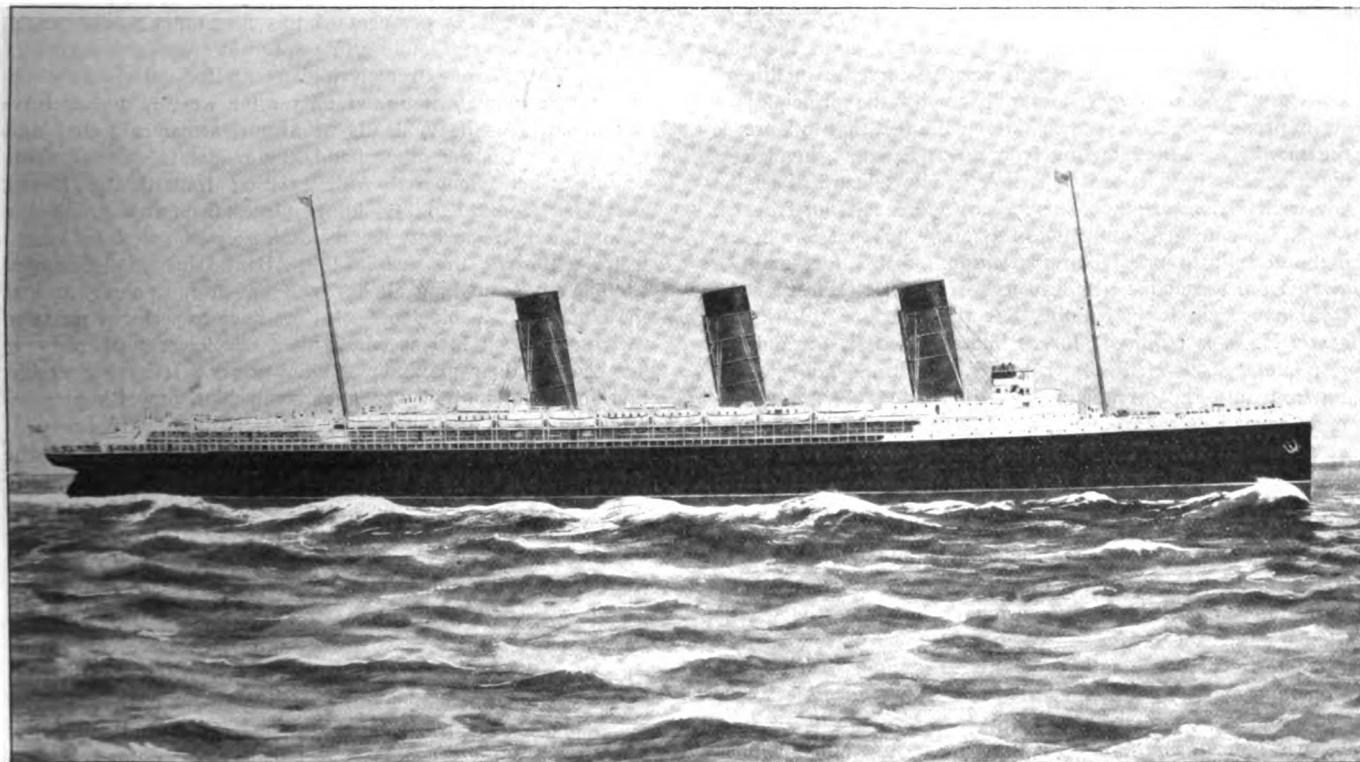


### THE NEW CUNARDERS

Sir William H. White, K. C. B., late chief instructor to the British admiralty, has an article in the *Atlantic Souvenir* just issued by the Cunard Steamship Co. Sir William is at present acting as adviser to Messrs. Swan & Hunter and Wigham Richardson, Ltd., who are building one of the new Cunard express turbine steamers, and he throws fresh light on the difficult problem which has been engaging ship builders and marine engineers in Great Britain recently in connection with the building of these leviathan steamers and also the turbine system as a mean of propulsion. He says:

"The exhibits of the Cunard Steamship Co. at St. Louis not merely epitomised the history of transatlantic steam navigation, but strikingly illustrated the enormous increase in size

to 88 ft., thus going beyond all precedent and exceeding that of the *Great Eastern* by 5 ft. The draught had also been considerably increased and made as great as the capacities of the terminal ports permitted. The total weight (or displacement) had been enlarged in proportion to the increase in dimensions, and the engine power more than doubled. This was the result of a thorough and prolonged inquiry made on behalf of the Cunard company by some of the most experienced ship builders and marine engineers of Great Britain, aided by the constructive and engineering staff of the admiralty, and by experimental inquiries made on models (by permission of the admiralty) in order to determine the form best adapted for this unprecedented sea speed. All the latest improvements in materials for ship building and marine en-



HOW THE CUNARD 25-KNOT TURBINE STEAMERS WILL LOOK WHEN COMPLETED.

and cost which has been associated with increase in the speed of steam ships during the last sixty years. The models in this remarkable collection having been made to the same scale, enabled visitors to appreciate the increase in dimensions which had accompanied increase in speed from an average of  $8\frac{1}{2}$  knots per hour in the *Britannia* of 1840 up to 22 knots in the *Campania* and *Lucania* of 1893. In this half century of continuous progress the length had been trebled (207 to 620 ft.), the breadth increased by 90 per cent, and the depth by 80 per cent; the tonnage had been raised from 1,150 to nearly 13,000 tons, and the engine power increased from 740 to 26,000 H. P. Great as the contrast was between the *Britannia* and the *Campania* to the ordinary visitor, the step now being taken in building vessels capable of maintaining a sea speed of 25 knots was probably more notable. The model of the two quadruple screw turbine-engined vessels just laid down, when compared with that of the *Campania*, impressed every observer with the enormous increase in dimensions which had been found necessary in order to fulfil the conditions embodied in the agreement between the British government and the Cunard Steamship Co., and to produce two steam ships 'capable of maintaining a minimum average ocean speed of from 24 to 25 knots an hour in moderate weather.' The length had been increased by 160 ft.; the breadth had risen from 65

gineering had been laid under contribution. A special committee appointed by the Cunard company, on which the technical departments of the admiralty, as well as private industry, were represented—had thoroughly investigated the relative merits of reciprocating engines and steam turbines in conference with Mr. Charles Parsons, whose experience with turbine machinery is unrivalled. As the result of their inquiry, the committee had unanimously recommended to the directors the adoption of steam turbines applied to four shafts, each carrying a single screw; and the directors had decided to adopt this recommendation. The large dimensions of the new vessels do not result from the provision of greater cargo-carrying capacity, on the contrary, like all other swift passenger steamers of the present day, the deadweight capacity for cargo is extremely small. That feature constitutes a radical distinction between the greyhounds of the Atlantic and the largest vessels of the intermediate type built or building, in which moderate speed is accepted, and large cargo, as well as large passenger capacity secured. The great increase in size and cost in these swiftest passenger steamers was inevitable under existing conditions. In order to produce vessels capable of steaming in moderate weather for 3,000 miles at an average speed of 24 to 25 knots, to carry the coal required for that voyage and to accommodate the number of passengers for

which it was decided to provide in the design, the dimensions decided upon were the least that could be expected. It is a proverb amongst seamen that 'the sea is always kindest to the largest ships,' and the unprecedented dimensions of the new vessels should secure for them an unrivalled power of maintaining speed in a seaway, in association with remarkable steadiness and freedom from pitching. Even the longest Atlantic storm waves have lengths which do not approach the length of the new ships, and their enormous breadth must diminish the tendency to roll. There is every reason, therefore, to anticipate for these great ships a high reputation for good behaviour at sea. To the non-technical observer it may seem remarkable that whereas it was found sufficient to add 100 ft. to the length of the *Etruria*, and to increase her engine power by about 80 per cent in order to add  $2\frac{1}{2}$  knots to the speed and to secure 22 knots in the *Campania*, it should be found necessary in passing from the *Campania* to the new ships to make such an enormous relative increase in dimensions and power. Everyone familiar with the principles of steam propulsion, however, well knows the fact that to increase the speed by a knot, starting from 19 to 20 knots, involves a much smaller proportionate increase in expenditure of engine power than does an equal increase of speed starting from 22 knots. In ship propulsion it is the 'last step' that is increasingly difficult to take. An illustration of this fact may be given from the actual performances of a swift cruiser of the royal navy, 500 ft. in length. For the speed of  $19\frac{1}{2}$  knots, 13,000 H. P. is required; for 22 knots, 21,500 H. P., and for  $24\frac{1}{2}$  knots, 33,500 H. P. that is to say, to gain  $2\frac{1}{2}$  knots, starting from  $19\frac{1}{2}$  knots, requires an additional 8,000 H. P., whereas an equal increase of speed, starting from 22 knots, requires an additional 12,000 H. P. If this cruiser were driven at 25 knots, she would require fully 36,500 H. P. Unless there were radical changes in the type of engines and boilers, the vessel could not contain propelling apparatus capable of developing that power, and a larger vessel would be required to attain the higher speed. In the development of transatlantic navigation, remarkable economies have been effected in the weight of marine engines in relation to their power, as well as in the coal consumption. In the *Britannia* of 1840, the propelling apparatus developed only about  $1\frac{1}{2}$  to 2 H. P. per ton weight and the consumption of coal was about  $4\frac{1}{2}$  to 5 lbs. per indicated H. P. With the best reciprocating engines of the present day, the propelling apparatus of transatlantic steamers gives a development of about 6 H. P. per ton of weight, and the consumption of coal is only about 1.5 lbs. per indicated H. P. per hour. This is the contribution of the marine engineer towards economy in size and cost. The substitution of iron for wood, and later, of steel for iron, has enabled great economy to be effected in the weights of ship-structures. Formerly this structural weight represented about 50 per cent of the total weight of the fully-laden ship, even in vessels of small dimensions. If wood had remained the chief ship building material, it would have been impossible to have approached the dimensions and speeds which have been attained. With steel of the qualities now procurable, naval architects are prepared to construct vessels of any dimensions and speeds which commercial considerations will demand, and notwithstanding the enormous increase in length, tonnage, and total weight, the proportion of that total weight (or displacement) devoted to structure is much less than it was in the days of small wooden ships. When all these improvements have been utilized, it still remains true that in order to produce vessels capable of maintaining a speed of 24 to 25 knots across the Atlantic, the adoption of the unprecedented dimensions above mentioned is necessary. The working sea-speed of the new Cunard steamships will exceed by  $1\frac{1}{2}$  knots the highest speeds yet attained on the Atlantic service. No warship possesses anything like an equal sea-speed or equal coal endurance at maximum speeds. Destroyers attain trial speeds

of 25 to 30 knots for a few hours, but their machinery and boilers are exceedingly light, and not adapted for continuous development of maximum power, while their speed for long distance steaming is necessarily moderate because of their small coal supply. 'Scouts' are intended to attain maximum trial speeds of 25 knots, but here again the sea-speed is relatively moderate, and the coal supply small. Even cruisers of the largest size, with trial speeds of 23 to 24 knots for eight hours, at sea can maintain only relatively moderate speeds, because of their less development of power for long distance steaming and their moderate dimensions. The swiftest armored cruisers afloat at the present time (represented by the *Drake* class—one of the latest of my designs) on an 8 hours' trial in smooth water averaged 24 knots with about 31,000 H. P. For continuous steaming at sea under service conditions about 75 per cent of this maximum power might be developed, corresponding to a speed in smooth water of 22 knots. This is an extremely high result for vessels only 500 ft. in length, and of 14,100 tons total weight, which total weight includes heavy loads of armor, armament, coal and equipment. On the other hand, the moderate size of these vessels, when compared with existing transatlantic liners, averaging from 22 to  $23\frac{1}{2}$  knots, places them at a great disadvantage in regard to the maintainance of speed in rough water. Besides this, while the Atlantic liner is designed specifically for making all her passages at full power and at the highest attainable speed, cruisers have to perform most of their services at low speeds, with a development of only 10 per cent of their maximum engine power. It is reasonable, therefore, to adopt in passenger steamships, propelling apparatus, having a greater margin of strength and greater proportion of weight to power, than would be adopted in the corresponding features for cruisers. This is one among many illustrations of a fundamental condition governing the designs of all classes of ships, it is necessary to have regard to the services for which each vessel is intended and to provide for the efficient fulfilment of that service. There is no universal pattern which the naval architect can follow. Twenty-five knots speed at sea (29 statute miles) compares favorably with the average speed attained by the fastest transcontinental trains of the United States or Canada. In the case of a ship, the conditions of propulsion correspond throughout with that of a locomotive engine going up-hill. There are no level regions, and no falling gradients to give relief to the propelling apparatus. The power to be developed in driving a great ship across the Atlantic is enormously greater than that which suffices for drawing the heaviest train at the highest speed. Locomotive engines make only short runs, and are then relieved by other locomotives, which enter upon their task in perfect condition, coming fresh from the shed. Marine engines have to work continuously for 3,000 miles in making the transatlantic passage, without opportunity for repair or readjustment. All this is taken as a matter of course, but is none the less notable. Nor should the importance of the human elements be overlooked. Organizing power, skill and endurance on the part of the engineer, officers and their staff are essential to successful working, and the magnitude of their responsibility will be fully appreciated when it is stated that to produce the required speed in the new ships, fully 1,000 tons of coal per day will have to be transported from bunkers to furnaces, then placed upon the firebars by trained stokers, and burnt in the most economical and efficient manner. Had oil fuel been available, considerable economies in weight of fuel would have been possible, and there would have been very large savings on staff and labor in the stokeholds. This matter, of course, received most careful consideration, and the decision to design the boilers for using coal was not reached until all the conditions of the problem, including the supply of oil fuel, had been investigated.



Should it become possible hereafter to ensure adequate supply of oil fuel, at such rates as would permit of its use, it will be a simple matter to suitably adopt bunkers and furnaces. Resultant economies in weight and in working would then be secured. In published accounts of these new vessels, special attention has naturally been given to the use of steam turbines instead of reciprocating engines, and many remarks have been made on the vast scale of the experiment which has thus been undertaken. The criticism is not an unfair one; it is a fact that, at one step, an advance has been made in the power of steam turbines, as applied to ship propulsion, equal to that which it has taken over forty years to effect with reciprocating engines. The most powerful turbines yet tried are those fitted in the third-class cruiser *Amethyst*, the last design for which I was responsible before leaving the admiralty. Here, on three turbines, an aggregate of about 12,000 H. P. has been installed, and it is satisfactory to know that in regard to both speed and economy of steam consumption, trials recently made with the *Amethyst* have proved eminently successful. But the advance from these turbines, each of about 4,000 H. P., to the four turbines of the new ships, each of which must develop more than four times as much power, corresponds practically with the advance made with a single set of reciprocating engines between 1860 and the present day. Two important facts require consideration in this connection. First, in the new Cunarders, if reciprocating engines had been installed, there would necessarily have been at least three engines, each driving a shaft and screw propeller. Each of these engines must have developed more than 20,000 H. P., and it would have been necessary to place one of the three engines abaft of the other two sets, and comparatively far aft in the ships. Consequently there would have been serious risk of troublesome vibration, even when all possible care had been taken to balance the moving parts, and no one familiar with the working of high-speed steamers can treat lightly the discomfort incidental to vibration. Second, if reciprocating engines had been adopted, there would have been a necessity for shafts of very large dimensions, and consequently, unusual difficulties would have had to be overcome in manufacture, which the comparatively slow rate of revolution possible with reciprocating engines would have required screws of large diameter for the utilization of power, and these features would have been unfavorable to high efficiency of propulsion. On the other hand, with more rapidly revolving turbines, all manufacturing difficulties with shafting disappear, crank shafts are not required, the shafts are of small size, the propellers are of moderate diameter, and there is every reason to anticipate higher propulsive efficiency. From this brief summary, it will be understood that the adoption of reciprocating engines in vessels of this great power and high speed must have been accompanied by many experimental features, the magnitude of which was probably as great as, if not greater than, that of the problems which have to be faced in connection with the use of steam turbines. There are undoubtedly difficulties to be surmounted in the manufacture of such large turbines, but they can and will be dealt with by the skill of the manufacturers and marine engineers. No design for the propelling apparatus of a steamship has been more carefully studied. There has been no disposition to minimize the responsibility incurred in making this new departure, and there is good reason to anticipate success. Moreover, there are not a few advantages certainly secured by the use of rotary engines, advantages which have been demonstrated, not merely in the application of steam turbines to marine propulsion, but in much more extended use on land in electric generating stations and elsewhere. Amongst these may be mentioned practical freedom from vibration, economy in space (particularly in height), and the possibility of more minute watertight subdivision, with consequent increase of safety—a matter of no mean importance in vessels designed to carry large

numbers of passengers. Many economies will also be possible in the engine room staff, and in the cost of maintenance and working. In regard to safety at sea and improbability of break-down of propelling apparatus, the 25-knot steamships will be superior to preceding vessels, because of the use of four shafts and four propellers. Moreover, large experience, chiefly in land service, but confirmed by marine practice, proves turbines to be less liable to accidents and interruption of work than reciprocating engines when run continuously for long periods. Some turbine-engined steamers of moderate dimensions have performed successfully voyages to America and Australia, encountering rough weather with most satisfactory results. Vessels of greater size and power are now building, so that experience with turbines will speedily be enlarged. The *Carmania* of the Cunard Line will be completed in August next; she is 650 ft. long, of 21,000 tons, and with 21,000 H. P. applied to three turbines and triple screws. Long before the 25-knot ships are completed there will consequently be ample information as to the practical working of large turbine engines on the Atlantic service, and further assurance of the advantages resulting from the new departure. From the public point of view, the construction of these vessels is of the highest interest, as restoring to the British flag that supremacy in speed at sea which was so long maintained, but which passed to the German flag after the construction of the *Campania* and *Lucania*. Official statements made on behalf of the government in connection with parliamentary debates on the agreement with the Cunard company, have brought into prominence the high value assigned by the admiralty to the possession of these great ships and their use as auxiliary cruisers in time of war. Apart, therefore, from the great importance attaching to the construction of the vessels as units in the splendid fleet of the Cunard company, it is indisputable that in the public interest the steps taken by the government in giving financial assistance to the Cunard company, in order that these costly vessels may be built and worked under the British flag, is an event which must have far-reaching consequences. On that account every one who has the interests of the empire at heart must join in the wish that the intentions of the design, so carefully considered and thoroughly elaborated, may be realized in the completed ships.

#### STEAMER FOR ARTILLERY SERVICE

Bids were recently opened by Capt. F. A. Grant, quartermaster's office, United States army, Seattle, Wash., for the construction of a single screw wooden steamer for artillery service in the district of San Francisco. The bidders were as follows: Fulton Iron Works, San Francisco, \$51,000; Moran Bros. Co., Seattle, \$58,503; Vulcan Iron Works, Seattle, \$30,116; Puget Sound Engine Works, Seattle, \$24,806; Willamette Iron & Steel Works, Portland, \$33,500; W. A. Boole & Son, San Francisco, \$40,750; C. J. Carlson, Port Blakely, Wash., \$39,750; Puget Sound Marine Works, Tacoma, \$36,440; Hall Bros., Winslow, Wash., \$33,815; Portland Iron Works, Portland, Ore., \$40,900; Heffernan Engine Works, Seattle, Wash., \$34,625. The bid of the Puget Sound Engine Works being the lowest the contract was awarded to it.

The steamer is to be 105 ft. length on deck, 96 ft. 10 in. length on water line; 22 ft. 4 in. beam, 10 ft. deep, 7 ft. draught forward and 8 ft. aft; speed, 12½ miles per hour. The steamer will be propelled by a vertical inverted direct acting triple expansion engine, with cylinder diameters 10 in., 17¼ in. and 28 in. by common stroke of 18 in. Steam is to be supplied by one Taylor water-tube boiler, and allowed a working pressure of 180 lbs. per sq. in. The steamer will be lighted throughout by electricity, and will be modern in all respects.

The lighthouse tender *Marigold* is being overhauled by the Ollinger & Bruce Dry Dock Co., Mobile, Ala.



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MARCH 9, 1905.

The launch of the Carmania for the Cunard Line is an event which has scarcely caused a ripple in the daily progress of the world; it has dismissed in the daily newspapers by a brief line or two, events so crowding upon one another as to become mere incidents in the day's work; and yet the launch of this steamer marks a virtual epoch in the world's history. It is far more than a mere addition to the already respectable list of ocean leviathans; it is virtually a recognition that the method of marine propulsion has come to the parting of the ways. The Carmania is one of the largest of the world's liners, being but 2,800 tons less than the Baltic. Her significance, however, does not lie in her bulk but in her engines. This great steamer, one of the largest in the world is, only eleven years after the experiments with the Turbinia, equipped with turbine engines. Despite setbacks and disappointments, inseparable from every new departure, the turbine engine has established its reputation and has advanced in favor as to justify the enormous risk involved in equipping a steamer of such great dimensions with this form of engines. It is only eighty-five years since the Savannah crossed the Atlantic, partly under steam and partly under sail, in thirty-five days—the brave forerunner of a fleet that has since swarmed in every sea. Steadily since then the time of passage has been reduced, until in 1859 the Persia

established a record of ten days. Now it is 5 days, 7 hours from Eddystone to Sandy Hook. The standard speed of 11 knots in 1850 has increased to 23.59 knots in 1904, the latter being accomplished by the Kaiser Wilhelm II. The Carmania is not intended to break the record, but she is the advance guard of two ships already on the stocks which are building under an absolute guarantee to maintain an average speed of 25 knots across the Atlantic regardless of any condition of weather.

The Marine Review has at all times sought to be a consistent advocate of the American merchant marine and has recognized that the interests of American ship builders and the American ship owner should be encouraged and protected. A large business has been built up by ship building firms in the construction of large dredges, but it would seem that even this industry were to be robbed from Americans, by a simple matter of governmental inattention. In our columns of this issue will be found an article by Dr. Frank Van Vleck of the bureau of steam engineering of the navy department directing attention to certain oversights in the application of the United States law to dredgers, and indicating a remedy by the simple expedient of enforcing laws already on the statute books. Before Americans are subjected to the further humiliation of possibly seeing Panama contractors steaming over from Europe with their foreign built dredgers and vessels—as they most assuredly will do if not prevented—would it not be well to enforce our present laws or to make new ones? The Isthmian canal commissioners did a great injustice to American shipping lines of the Pacific, when in a moment of canal economy they let the large lumber shipping contract to a German steamship line. Possibly also if these commissioners thought they might save a few dollars, they might permit contractors to use foreign built dredgers and other vessels, or the commissioners might themselves place orders for dredgers in Europe. If our laws stand shall we not apply them? If the laws have not been confirmed by judicial decisions, let us at once enforce them and throw the burden of making the test on those who seek to infringe them.

In the Panama edition of the Marine Review published in October last it was hinted that the plan finally recommended for the canal would be a sea level canal. Of course, it is understood that such a thing as an absolutely sea level canal across the isthmus of Panama is not possible, owing to the wide difference between the tides on the Atlantic and Pacific coasts. This difference must be met by twin tidal locks at Maraflores, but otherwise the canal will be at sea level. Pending this decision the commission has confined actual constructive work to those portions which could not be influenced by any ultimate determination as to whether the canal should be at sea level or not. Therefore con-

structive work has this far been concentrated on the Culebra cut. The Isthmian Canal Commission has now recommended a canal with a bottom width of 150 ft. and a minimum depth of water of 35 ft., with two locks at Maraflores, 1,000 ft. long and 100 ft. wide, at a total estimated cost of \$230,500,000. These dimensions are doubtless ample because all commercial authorities agree that it will be many, many years before any considerable commerce utilizes the canal. The highest estimate has been 6,500,000 tons per annum, but it is doubtful indeed if such a figure will be reached for a decade or more. The tonnage of Suez is approximately 11,000,000 but Suez connects the workshops of Europe with the teeming millions of the orient. The Panama canal merely connects two wide oceans. It is not expected that it will divert any of Suez's commerce with the east because it does not offer the advantage of saving in distance. It is extremely important to note that the commission believes a sea level canal can be constructed within from ten to twelve years of the present time.

It is but fitting to say that Mr. Harvey D. Goulder, counsel for the Lake Carriers' association, performed excellent service for the steamship interests of the country during the past month in Washington. It was largely through his efforts that legislation unfavorable to steamship interests was kept off the statute books. No person is better informed as to the needs of the steamboat service than Mr. Goulder. He is quite aware that the vessel interests are willing to do everything within their power to safeguard the lives of passengers. They naturally do not want to have unnecessary provisions imposed upon them, and it was only the provisions that were unnecessary and useless that Mr. Goulder protested against. He was successful in his protest and such action as has been taken by congress upon steamboat matters is quite satisfactory to the steamboat interests of the country.

#### ORE CHARTERS AT 75 CENTS

While the Pittsburgh Steamship Co. has not yet made known its requirements which are, however, expected to be heavy ore shippers generally are making season contracts freely and it would not be surprising if 10,000,000 tons were chartered before the week is out. Chartering is upon a basis of 75 cents from the head of the lakes, 70 cents from Marquette and 60 cents from Escanaba. This is 5 cents better than the rate which obtained last year and is precisely what it was predicted it would be more than a month ago. Upon a movement of 30,000,000 tons it means added gross earnings on behalf of the vessels of \$1,500,000 over an equivalent movement last year. Ore shippers are covering their requirements very fully by contract which robs the wild rate of any speculative feature. Both rates have been an approximation for the past few years so that the interests of both sides is towards the chartering of tonnage for the season. More tonnage has been chartered at the start this season than at any time in the history of the trade and as soon as the weather permits navigation will open with a rush. Vessel owners would like to have established the

rate at 80 cents but notwithstanding the enormous amount of ore to be moved they were not in position to demand that rate. After paying operating expenses and interest on bonds last year there was little left to distribute among stockholders, even among the better class of vessels, and probably the more moderate sized tonnage had nothing whatever left to distribute. Operating expenses will be the same this year as last with the exception that the deckhands will get \$2.50 per month more and the engineers on first class vessels \$25 per month more. As business will be brisk from the start the point of congestion will of course be the receiving docks. Unusual efforts will be made, however, to give dispatch on the docks and there is reason to believe that the delays will not be more serious than they were last year. During the busy months of last year an average of over 4,000,000 tons was transported each month without especial difficulty, the delays in port being unimportant and there is no reason why the same record may not be obtained this year.

No coal charters are as yet recorded but the contract rate will probably be the same as last year—35 cents with the customary differential of 10 cents to the small ports on Lake Michigan.

The opening rate in lumber has been fixed at \$2.25 which is 25 cents less than the association's announced rate last year.

#### PERSONAL

The advancement of Mr. James S. Stirling who was recently elected president of the Crescent Ship Yard Corporation and of the S. L. Moore & Sons Corporation, Elizabethport, N. J., both subsidiary companies of the Bethlehem Steel Corporation, has been unusually rapid. Mr. Stirling who is not yet thirty-four years old entered the cost department of the Harlan & Hollingsworth Co. in 1891 and in 1892 was made superintendent of the foundry department. He was appointed to the position of vice commissioner of the National Founders' association in January, 1903, and continued in that position until he resigned to become associated with the S. L. Moore & Sons Co. Mr. Stirling was vice president for three years of the Philadelphia Foundrymen's association and was a member of the third district committee of the National Founders' association during 1901 and 1902.

Earl Cawdor has been selected to succeed Lord Selborne as first lord of the British admiralty, following the latter's appointment as high commissioner to South Africa as successor to Lord Milner who resigned some time ago. Archibald Vaughn Campbell, the earl of Cawdor, was born in 1847. He is chairman of the Great Western Railway Co. and has had an extended business experience.

In the last issue of the Review it was stated that in average carrying capacity Mr. Tomlinson's fleet was first with 7,276 gross tons, Mr. Henry A. Hawgood's second with 6,340 tons, Mitchell & Co.'s fleet third with 5,453 tons, and W. A. Hawgood's fourth with 5,165 tons. The United States Transportation Co. calls our attention to the fact that with the new 10,000-ton ship Lyman C. Smith, building for their fleet, the average carrying capacity of their fifteen steamers will be 5,800 gross tons, so that the fleet safely takes third place. This puts the Steel Corporation's fleet in the sixth place, with an average carrying capacity of 5,136 tons, but it must be remembered that the Steel Corporation has sixty-one vessels whose average carrying capacity is 6,319 tons.

The new Anchor Line steamer Tionesta will leave Buffalo on her first trip May 4.



### NEW TYPE OF STEERING GEAR

Lincoln A. Lang of the Lang Radial Valve Gear Co., St. Paul, Minn., has just brought out a new type of steering gear, primarily adapted to the purpose of steering vessels, but applicable to a wide variety of other uses, such as controlling power feeds, operating elevators or hoists, or adjusting heavy valve gearing. In this design of controlling device three things have been accomplished as follows: First, the graduated travel of a power actuated piston, both the speed and extent of travel being entirely under the control of the operator; second, the automatic power locking of the piston by the motive agent upon completing a given movement, and third, the perfect freedom from shock when starting and stopping. Reference to the accompanying drawing will clearly show how these features are obtained, the proportions of the various parts and passages being adapted to steam or compressed air and may readily be modified to suit hydraulic requirements when desired.

The sectional view, Fig. 1, shows a circular valve chest com-

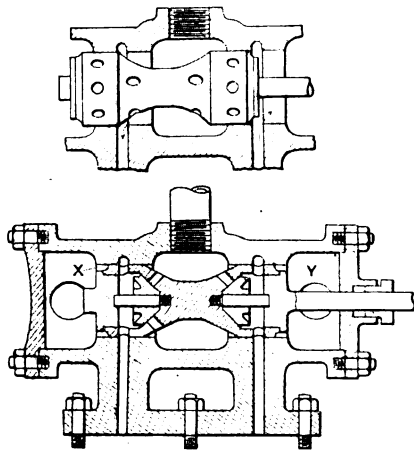


Fig. 1. SECTIONAL VIEW OF VALVE.

municating with either end of the power cylinder by means of pipes or cored passages X Y, having central admission and end exhaust. Within the chest is a piston valve, which, when in its central position opens communication between the power chamber and both ends of the main cylinder, the motive agent passing into the interior of the valve and through the holes, displacing the spring check valves in its passage. It then passes from the interior of the valve into the main cylinder ports through holes surrounding the valve faces, these holes being arranged exactly in line with the main ports when the valve is in its mid-position. Under these conditions power is applied equally upon both ends of the main piston, while the checks in the valve interior render circulation of the motive agent impossible. The main piston, therefore, is locked against exterior disturbing influences with a degree of rigidity determined by the compressibility of the motive agent.

• For certain purposes, such as steering, some elasticity is desirable to prevent the breakage of chains or other connections. This is provided for by the use of an elastic motive agent, while in cases where rigid locking is desired water may be used. When the valve is in its central position any diminution of power in either end of the cylinder due to leakage or other cause will immediately be made good through its corresponding check, hence the main piston is maintained in the position shown in Fig. 2.

If now the valve be moved to the position shown in the part sectional view, Fig 1, the piston will move to the right, the right-hand port having been opened to the exhaust, while the left-hand port is opened to the valve chest, and the locking passages or holes are at the same time thrown out of action over the valve seat. A similar movement of the piston to the

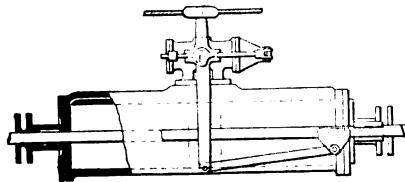


Fig. 2. SIDE ELEVATION OF MOTOR.

left results when the valve is moved to the right. The object now to be attained is to so couple the valve to the piston, so that it will be shifted back to its central or locking position by the time the piston has reached a given point in the cylinder. At this point the exhaust end of the cylinder will at once be filled from the interior of the valve and the piston will be again locked in its new position.

In the diagram, Fig. 3, A is a lever pivoted at B and carrying arms C C' to which stops B' B'' are attached. D is a floating lever pivoted to A at E, and linked to the crosshead projection, F, by means of the link G. H. is a valve lever pivoted to D at I and to the valve stem at J. A may be a hand lever with a suitable quadrant and catch, or may be actuated by ropes from a distance.

When A is swung to one side, as shown, it carries the valve, K, to the right which starts the main piston to the left, and with it the projection, F, which in turn carries the lever, D, back again, thus tending to return the valve, K, to its central or locking position. This position will have been attained

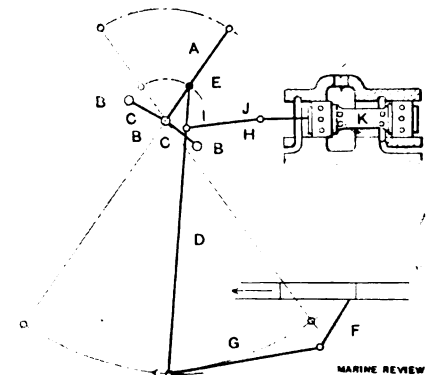


Fig. 3. DIAGRAM OF VALVE GEAR

when the lever, D, has been carried in line with A, the pin, I, being then directly over the pivot, B. From this it will be observed that any desired angle of displacement may be given to A, and that when D has been returned in line with it by the moving crosshead, the valve will be central and the piston locked.

It will be noted that some lap is given the admission edges of the valve. This is to cause the exhaust to open at one end previous to admission at the other and especially when the valve is displaced by hand. Following a given displacement of the valve, the first movement of the piston will be due to the expansion of the motive agent at one end. A further valve displacement being necessary before admission can take place. Similarly, when the valve is returned, due to the moving crosshead, admission will be cut off previous to exhaust closure, by which means the power exerted upon the piston at the time of starting and stopping is graduated, thus avoiding shock and causing the piston to start and come to rest easily.

While the lap of the valve is more particularly adapted to expansion motive agents it will be noted that for hydraulic use it will also tend to act in the same way, viz., if the valve be designed so that the exhaust at one end is slightly opened before locking ports at the opposite end have entirely passed over the seat.

The stops, B B', are more particularly adapted for use in connection with expansive motive agents, where the spacing determines the proper amount of port opening and limits the piston speed and power to actual requirements.

In the indirect arrangement the floating lever, D, is pivoted upon a downwardly projecting extension of A and a rocker arm used to transmit motion to the valve stem as plainly

shown (Fig. 2). This arrangement results in a greater valve travel for a given displacement by hand with a correspondingly quick response of the piston.

When applied to elevators the lever, A, is operated from the car by means of a hand lever and a quadrant having a notch for every floor, thus to reach any given floor it is only necessary to place the hand lever in the corresponding notch, the piston stopping and locking when the required point is reached. A peculiar feature of the arrangement is that the hand lever does not have to be returned to a given point to stop the piston. The arrangement is particularly well adapted to operating feed carriages in saw mills, affording complete control of speed, power and travel, as well as removing any source of danger at the hand of the operator. It might also be used for reversing and adjusting the point of cut-off in heavy locomotives.

It may be said as to the method of attaching the tiller chains that the ends of the piston rods each carry an idler sheave around which the chains are passed, one end of each chain being rigidly fixed, while the other ends attach to the tiller the pull thus being exerted on the bight of the chains and so multiplying the travel, thus rendering a long cylinder unnecessary. A rod is also attached to any convenient moving part of the system and arranged to operate a pointer in the pilot house so as to register the rudder position at all times. Hand emergency gear may be applied in the ordinary manner with a simple clutch to disconnect the wheel. The entire arrangement is adapted to secure a reliable and noiseless action as well as marked economy in the use of steam. The latter qualification will be understood by noting the effect of the steam lap on the valve, which causes a slow movement of the valve operating lever to result in expansive working of the motive element, a faster movement (through producing greater initial valve displacement) resulting in direct application of the motive power to the piston. Where the latter action alone is desired, it is, of course, only necessary to omit the lap feature of the valve. The inventor says that all claims made for this apparatus have been very fully demonstrated by means of an experimental machine, changes having been made from time to time until the results became as desired, and a piston movement secured which is a very close approximation to that of the operator's hand.

#### CLOSED WITH LABOR ABOARD SHIP

Agreements with the Seamen's union and the Cook's union have been made for the season of 1905 with the executive committee of the Lake Carriers' association to the satisfaction of all parties concerned. As regards labor aboard ship there remains nothing now to be closed except the agreement with the firemen, oilers and water tenders and upon this score no trouble whatever is to be anticipated. Broadly speaking there is no change in the agreement with the Seamen's union from that of last year, that is to say the changes are of such minor detail as to call for little comment. The deckhands are to get \$27.50 per month up to October 1 and \$37.50 per month thereafter until the close of the season. This is an advance of \$2.50 per month up to October 1, but no advance thereafter over last year's scale. The same number of deckhands are to be carried as were carried last year except that the exact number is now specified. There were individual instances last year wherein boats did not carry the required number of deckhands and therefore the provision as to the least number is inserted to cover these individual cases. Steamers in the package freight trade of 2,400 to 2,500 gross tons register shall not carry less than five deckhands. Package freight steamers of 2,500 gross tons and over shall carry six deckhands. The coarse freighters from 1,500 to 2,500 tons are to carry three deckhands, from 2,500 to 4,000 tons four deckhands, from 4,000 to 5,500

gross tons five deckhands and over 5,500 gross tons six. As there was some complaint that in special instances last year masters worked their men unnecessarily beyond their watch, the executive committee inserted a provision that the men were to be given watch and watch whenever possible, the captain, however, to be the sole judge as to the necessity of when he requires the services of the whole crew.

Tow barges of from 850 to 2,100 gross tons shall carry one mate, one donkeyman and four able bodied seamen. Tow barges of over 2,100 gross tons shall carry one mate, one engineer or donkeyman and six able bodied seamen. On whalebacks of the smaller class carrying a towing machine and carrying an engineer they shall carry a mate and four able bodied seamen. A further clause was inserted to the effect that if a vessel went out of commission before the completion of the trip for which the crew was engaged the crew were to receive railway transportation to the port where the trip was begun. Toledo was stricken off of the list of offices of the Lake Seamen's union and Detroit substituted in its place.

The wages briefly are: Wheelmen, watchmen and lookout, \$45 per month until Oct. 1 and \$65 thereafter; ordinary seamen or deckhands, \$27.50 per month to Oct. 1 and \$37.50 per month thereafter; mates on tow barges of the larger class \$70 per month for the entire season; mates on other barges not less than \$10 per month more than seamen on the same vessel, and donkeymen \$5 per month more than seamen; able bodied seamen on tow barges \$45 per month until Oct. 1 and \$65 per month thereafter; engineers on tow barges carrying towing machine \$67.50 per month. It was agreed that the wages on steamers and barges while fitting out and while the crew is not boarding on the vessel shall be \$1.75 per day.

The cooks are to be paid the same scale as prevailed last year, the only difference in fact in the whole agreement being on the subject of porters. All vessels of 4,000 tons and over are to carry porters permanently and all vessels under 4,000 tons must carry a porter when the vessel has three passengers aboard. It was specified, however, that all vessels regardless of tonnage that carried porters during 1904 must carry porters during 1905. This is much like the old English law, once an Englishman, always an Englishman—once you carry a porter always you carry a porter. The porters are to get \$25 a month.

The executive committee of the Lake Carriers' association would have met the Firemen's union during the present week but were unable to make an engagement with Mr. Keefe, their representative.

#### LOCAL INSPECTORS MUST EXAMINE APPLICANTS

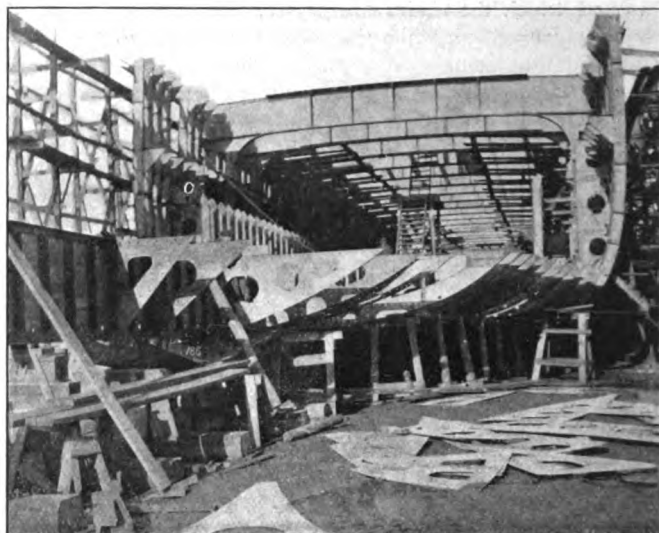
Capt. C. H. Westcott of Detroit, supervising inspector of steam vessels, eighth district, gave a decision last week to the effect that local inspectors must examine applicants for steamboat licenses after they have sailed three consecutive seasons of eight months each. The local inspector of boilers at Port Huron had declined to grant an assistant engineer's license to James E. Bingham who had sailed as fireman for three seasons on the steamer Oscar F. Flint. The local inspector's reasons for denying the application were that Bingham had been unable to secure the signature of two chief engineers to his application. According to the rules of the Marine Engineers' Beneficial association a man must put in thirty-six months as fireman and oiler before members of that organization can endorse his application for license. The government, however, requires a man to work only three consecutive seasons of eight months each. On two or three occasions the American association of Masters & Pilots and the Marine Engineers' Beneficial association have endeavored to amend the rules governing the inspection

tion of steam vessels to make it mandatory that an applicant for a pilot's or engineer's license should have the endorsement of accredited representatives of their associations. The federal authorities, however, very wisely declined to amend the rules in this particular for the reason that it would virtually empower these associations to regulate the number of men that might obtain government licenses as government engineers or pilots. The rules therefore merely state that "when practicable" the applicant must get the written endorsement of certain licensed officers. It therefore remains optional with the inspector whether he will grant the license with or without the endorsement. Mr Bingham brought with him the endorsement of the master under whom he worked and also letters of recommendation from three chief engineers, who however could not according to the rules of their association sign his application. Capt. Westcott's decision makes it mandatory upon the local in-

tion of unloading machines. The work is being done by the American Ship Building Co. at Milwaukee.

The A. Booth Co. of Chicago has bought the plant and good will of the White Line Transportation Co. which has operated a passenger and freight service between Duluth, Hancock and Port Arthur for a number of years. The White line was organized six years ago by W. H. Singer and operated the passenger steamers Bon Ami, Mabel Bradshaw and Easton.

The steamer James C. Wallace building at the Lorain yard of the American Ship Building Co. for the Acme Steamship Co. of Duluth, was launched today (Thursday). She went into the water with her engines and boilers aboard and spars and will be ready to go into commission within ten days. Her launching weight is about 600 tons greater than that of the Wolvin. She was christened by Miss Lydia Wallace, the daughter of Mr. J. C. Wallace.



VIEWS SHOWING PROGRESS OF CONSTRUCTION OF STEEL CORPORATION STEAMER GEORGE W. PERKINS.

[Building at the West Superior yard of the American Ship Building Co.]

spectors in his district to examine applicants when they have fulfilled the strict interpretation of the government statutes.

#### AROUND THE GREAT LAKES

The Canada Ship Building Co. has about completed its plant at Bridgeburg, Ont.

The lighter Active will be equipped with McMyler hoists and Swedenborg clamshell buckets.

Capt. James Davidson of West Bay City has sold the steamer Nicaragua to the Ogdensburg Coal & Towing Co. of Ogdensburg, N. Y., for \$29,500.

The Marine Transportation Co. of Ogdensburg has purchased the steamer Nipigon and consort Melbourne, belonging to the David Whitney estate of Detroit.

The Dominion government has awarded a contract to the Bertram Ship Building Co., Toronto, for the construction of a new quarantine steamer to cost \$85,000.

George J. Arnold, Mackinac Island, who has managed the passenger steamer Iroquois for several seasons, has chartered her to the Dunkley-Williams Co. for the summer.

The Pittsburg Coal Co. has absorbed the entire stock and holdings of the Jones & Adams Co. which has extensive coal docks at Duluth, Superior and Ashtabula. The consideration is said to be \$500,000.

The steamers Hendrick S. Holden and William E. Reis, belonging to the Mitchell fleet, are having all the 'tween deck beams and stanchions cut away in order to facilitate the opera-

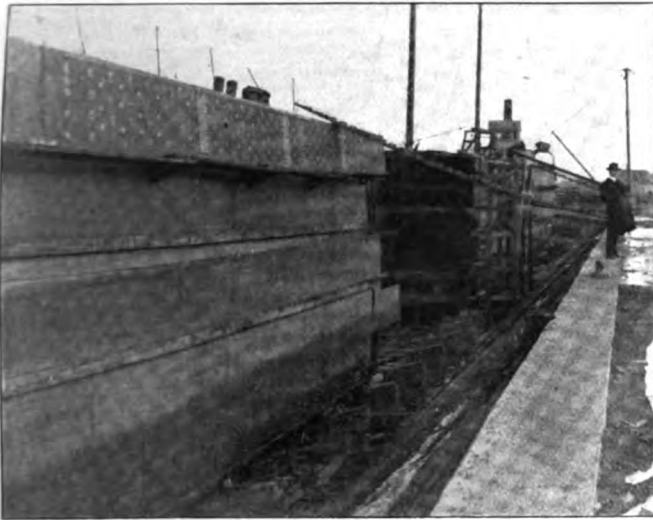
Major J. G. Warren, government engineer at Milwaukee, will hold an examination to perfect an eligible list for vacancies which may occur in the positions of master, mate, second mate, engineer and assistant engineer on the lighthouse tender Hyacinth during the coming year. Applications may be obtained from him either in person or by mail. It is not necessary for an applicant to appear in person in order to enter the competitive lists.

The work of dock repairs in and around West Duluth is assuming rather extensive proportions. The extension to the Boston coal dock to cost \$300,000 is progressing satisfactorily. This dock is having 1,450 ft. added to its length, making it in all 2,350 ft. long and 350 ft. wide. Work is also being rushed on the Mesaba ore dock just east of the Boston coal dock. This dock is being nearly doubled in length, and nearly all the under water work has been finished.

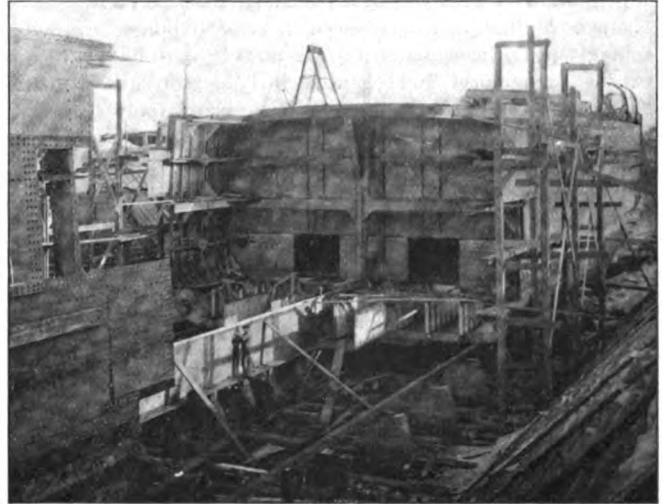
The steamer Wyandotte owned by the Clark estate of Detroit was sold last week to the Long Island Railway and will be used in that railway's service on Long Island sound. While running to Detroit river points the Wyandotte was managed by Ashley & Dustin of Detroit, but last season she was taken to Buffalo and ran to Crystal Beach. She will be extensively remodeled by the Great Lakes Engineering Works, Detroit, Mich., before she leaves for the coast in the spring.

The Canada Launch Works, Toronto, will change its name to the Canada Launch & Engine Works, and has increased its





STEAMER VICTORY BEING ENLARGED AT THE WEST SUPERIOR YARD OF THE AMERICAN SHIP BUILDING CO.



BARGE CONSTITUTION CUT IN TWO AT THE WEST SUPERIOR YARD AND BEING LENGTHENED KEEL PLATE IN POSITION.

capital from \$40,000 to \$100,000. New officers have been chosen as follows: B. W. Folger, president; M. M. Whittaker, vice president and manager, and John Henry, secretary-treasurer. Contract has been closed with the Lake Shore Engine Works, Marquette, Mich., for Canadian rights under which the company will make the Marquette company's motors at Toronto.

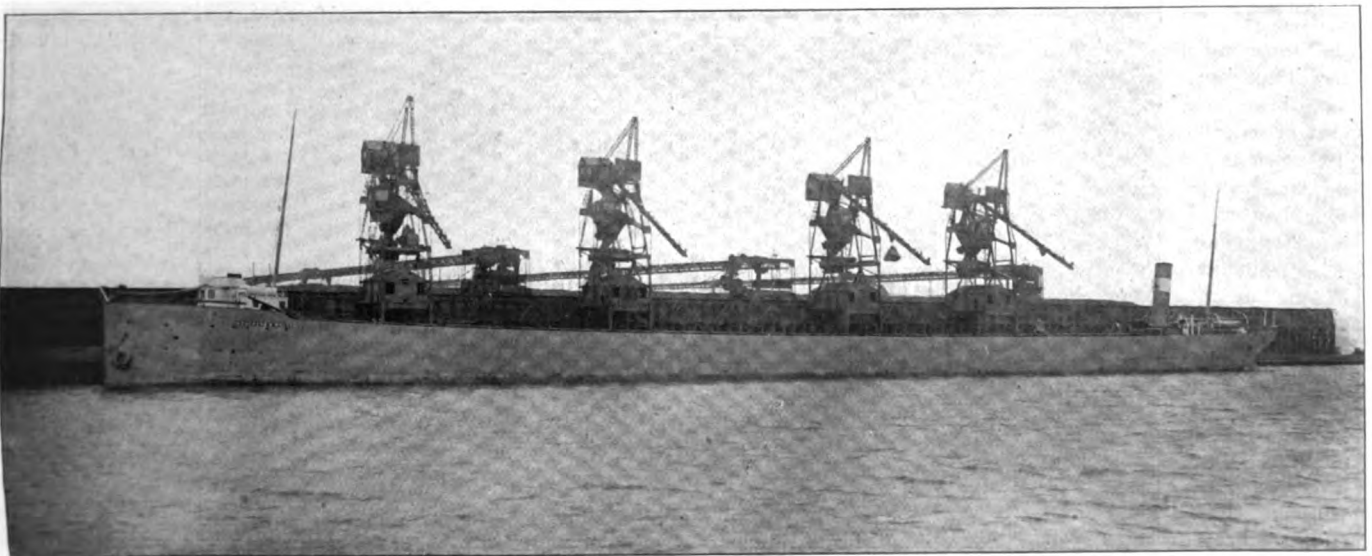
One of the strongest organizations in the marine insurance business on the great lakes has been formed by the partnership of Orr & Wall, who have opened offices at suite 47-48-49, No. 2 Sherman street, Chicago. This company has been appointed general agents for the Columbia Insurance Co. of New Jersey, Firemen's Fund Insurance Co. of San Francisco, Cal.; Mannheim Insurance Co., Mannheim, Germany, and the Union Marine Insurance Co., Ltd., of Liverpool, England. Mr. Orr was formerly the senior partner of the firm of P. H. Fleming & Co., Chicago, which up to Jan. 31, last, handled the business of the Columbia Insurance Co. and the Union Marine Insurance Co.; while Mr. Wall was heretofore associated with Henderson Bros. at 176 Jackson boulevard, Chicago, who formerly had the agencies of the Firemen's Fund Insurance Co. and the Mannheim Insurance Co. The concentration of these four well known companies under one management should result in

direct benefit to their patrons, as well as of great advantage to the mercantile and shipping community in general.

#### INJURED AT MESABA DOCK

The falling of a derrick and engine on the Mesaba ore dock at Duluth last week killed a man and seriously injured three others. The cause is believed to have been the giving away of the truss which supported the apparatus. The injured men, a derrick crew, were at work on top of the approach, 60 ft. from the level of the bay, and had been engaged in pulling down the approach to make way for an extension when the accident occurred. All the men injured were in the frame shanty which inclosed the engine as the support gave way and were unable to even make an attempt at saving their own lives. They fell with the heavy machinery and were so entirely buried under the heavy timbers that some time elapsed before they could be extricated.

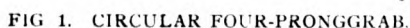
Percy & Small, Bath, Me., will build a five-masted schooner for Wm. F. Palmer of Boston. The schooner will be 275 ft. keel, 47 ft. 5 in. beam and 27½ ft. deep. She is intended for the coasting trade.



THE MESABA DOCK AT DULUTH WHERE THE ACCIDENT OCCURRED.

[Copyrighted 1905 by Detroit Photographic Co.]

Mayo & Bailey, First National bank building, Chicago, selling agents, have placed on the market self-filling buckets of the orange-peel and clam shell types for which many points of excellence are claimed. They claim for the orange peel bucket that in working in iron ore it will always fill to



The principal feature is in the system of operating levers and it will be seen from the drawing in Fig 1 that the bars

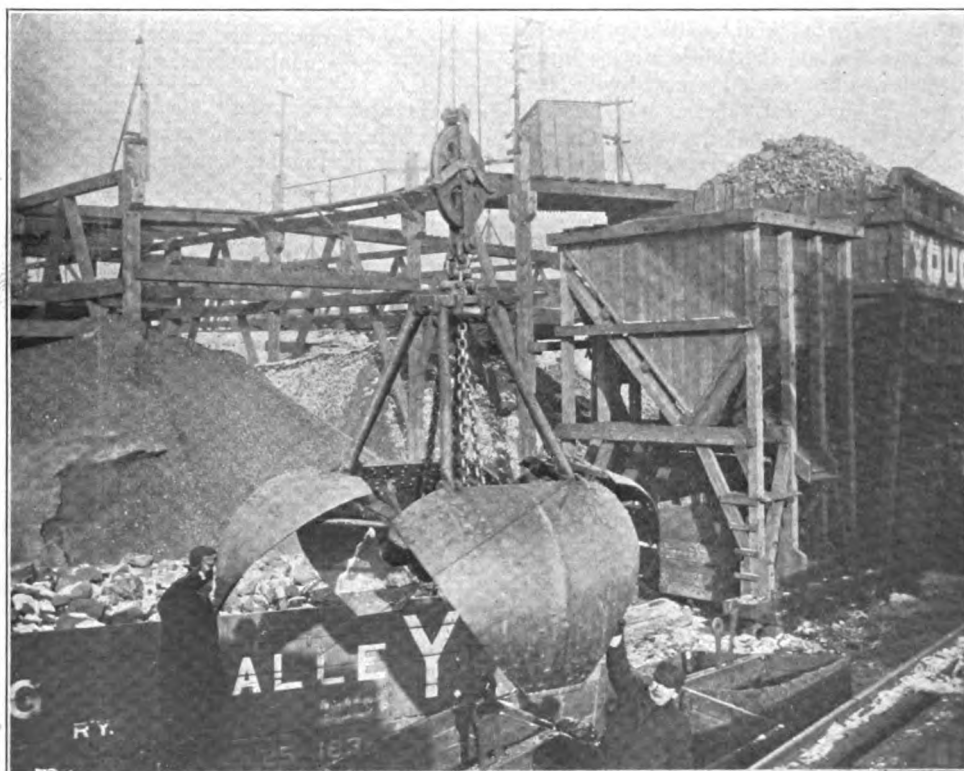


FIG. 2. VIEW OF OPEN BUCKETS.

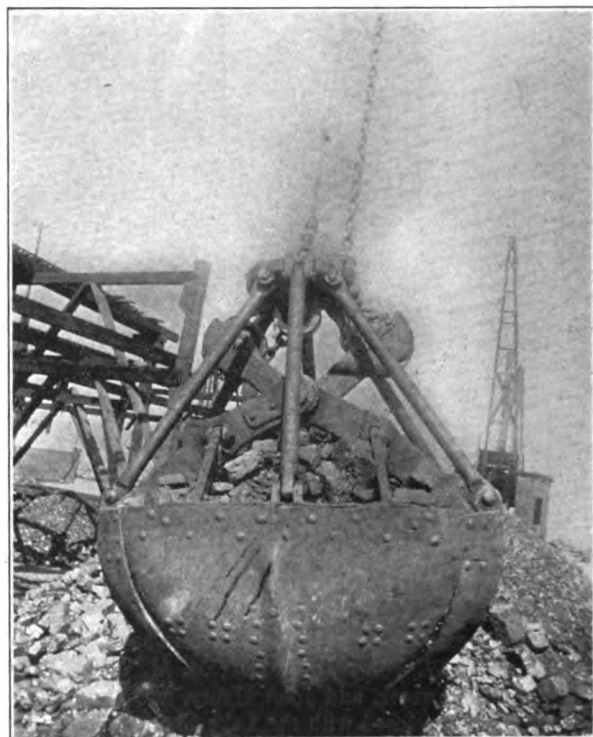


FIG. 3. SHOWING BUCKET FILLED TO ITS FULL CAPACITY.

connecting the pivoted levers with the sections of the bucket shell are attached well down in the shell, thus giving greater power than if attached nearer to the top of the bucket. The hoisting cable passes around the sheaves on the levers and has its end attached to the head frame of the bucket. The second cable is attached directly to this frame. The bucket

is held at any point by this latter cable, and dumped by paying out the hoisting cable, which allows the bucket to open.

For buckets used in unloading boats, barges or cars, an important feature is that two of the four sections end in a flat lip 15 in. wide, and when the bucket is open these project about 12 in. below the sharp points of the other two sections; thus the floor of a car or vessel is not liable to injury by the points of the

bucket when dropped. This is clearly shown in the view of the open buckets in Fig. 2. For buckets used in dredging and excavating, the flat lip is made narrower.

The orange-peel bucket is said to be specially adapted for working in soft coal, and it will fill to its full capacity when working in large-sized soft coal, as shown by the view of the closed

bucket in Fig. 3. When rested (not dropped) upon a pile of coal, ore, stone, etc., the action of the levers and the shape of the shell cause it to settle down into the material and take a full load in the act of closing. The tendency is

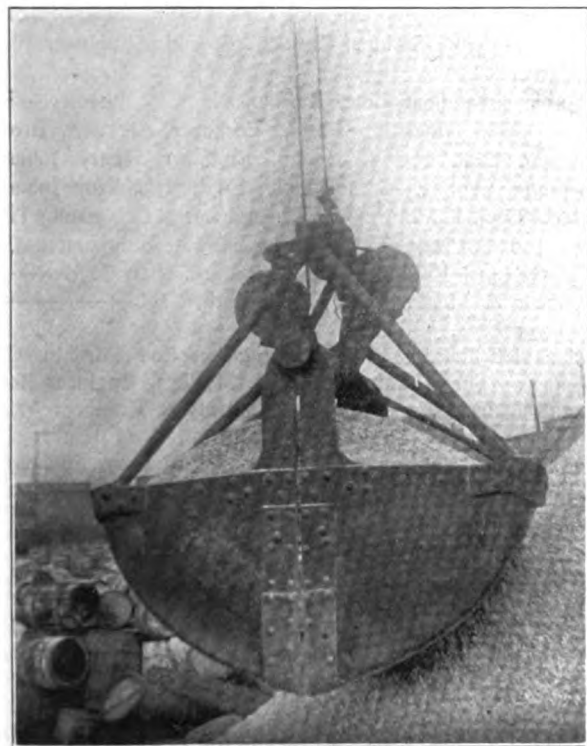


FIG. 5. SHOWING THE CLAM SHELL BUCKET.

to dig down instead of scraping along the pile, and when working in soft coal this reduces the breakage of the large lumps. As the bucket does not need to be dropped it can be

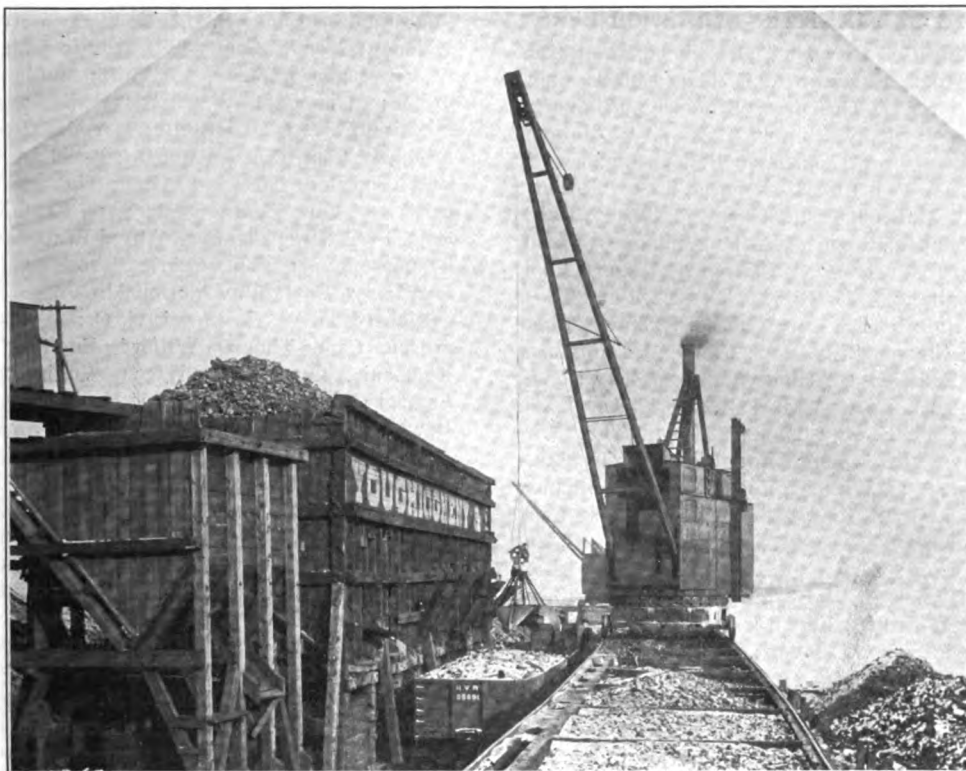


FIG. 4. KIESLER ORANGE PEEL BUCKET OPERATED ON A McMYLER DERRICK AT THE Y. & L. COAL CO.'S FUELING DOCK, CHICAGO.

used to advantage in unloading boats, as when lowered it can be swung to either side under the deck and so used to clean out the material between the hatchways. In unloading 40-ton cars of Hocking lump coal, under actual working conditions a 2-ton bucket of this type unloaded about 85 per cent of the coal in the car in an average of 30 to 35 minutes

The buckets can be used on any hoisting tower, crane, bridge tramway, dredge or derrick having a two-line hoist; and can be used on a one-line hoist by the addition of an idler drum and counterweight. The buckets are manufactured by Joseph Kiesler, Chicago, Ill., who is also the inventor of them.

#### WANTED—A SHALLOW DRAUGHT STEAMER

The Grand river from Grand Rapids to Grand Haven, Mich. is about to be successfully navigated. The Grand Rapids & Lake Michigan Transportation Co. of Grand Rapids has been organized to operate the route and all the necessary capital has been subscribed. The company is in the market for two shallow draught stern paddle-wheel river steamers of from 130 to 150 ft. in length and from 27 ft. to 30 ft. beam, drawing not more than 34 in. loaded. Anyone having such steamers for sale would do well to write to Mr. W. S. Farrant, 89 Pearl street, Grand Rapids, Mich. who is the general manager of the company. The officers of the company are Robert W. Irwin, president, Charles B. Kelsey vice president, Wm. H. Anderson treasurer and Henry T. Heald secretary. The executive board consists of Robert W. Irwin, Charles H. Leonard, Amos S. Musselman, Gains W. Perkins and Henry B. Herpolsheimer.

H. Hurdon, general agent for the Northern Navigation Co., has returned from Winnipeg where he formed one of a curling rink that came within one point of carrying off the Royal Canadian trophy. This was an exceptional victory for the best curlers of this country and Britain compete in this event.

The Vesuvius, built several years ago and equipped with dynamite guns, is to be converted into a torpedo boat to be used specifically during peace as a practice vessel at the torpedo training station, Newport. As a dynamite cruiser she proved to be useless.



### APPOINTMENTS OF MASTERS AND ENGINEERS

Pittsburg Steamship Co., Cleveland, O.: Steamers—Bessemer, Capt. W. S. Hoag, Engineer A. G. Haig; Black, Capt. M. A. Boyce, Engineer J. Hegemer; Bruton, Capt. George Holdridge, Engineer J. Skelly; Punsen, Capt. J. W. Morgan, Engineer J. F. Wood; Corey, Capt. F. A. Bailey, Engineer M. Toner; Cambria, Capt. T. J. Cullen, Engineer E. R. Leedram; Colgate, Capt. A. G. McLeod, Engineer Joseph Hasler; Coralia, Capt. W. H. Campau, Engineer A. P. Williams; Cornell, Capt. W. H. Kilby, Engineer G. C. Lawrence; Corona, Capt. J. T. Gemmell, Engineer J. H. Riffin; Corsica, Capt. H. J. Regan, Engineer T. McKenzie; Cort, Capt. J. R. Noble, Engineer E. H. Pelton; Crescent City, Capt. Frank Rice, Engineer A. E. Budemeyer; Eads, Capt. Arthur Montague, Engineer C. A. Fletcher; Edenborn, Capt. A. J. Talbot, Engineer S. H. Hunter; Ellwood, Capt. C. H. Cummings, Engineer F. Harringer; Empire City, Capt. A. R. Robinson, Engineer F. Mansfield; Ericsson, Capt. E. O. Whitney, Engineer A. P. Williams; Fairbairn, Capt. C. J. Grant, Engineer D. Frazer; Frick, Capt. Neil Campbell, Engineer A. L. Eggert; Fulton, Capt. C. C. Ennis, Engineer G. Arnold; Gary, Capt. Richard Jolie, Engineer J. Dupont; Gates, Capt. J. A. Walsh, Engineer J. W. Greiner; German, Capt. Robert Brooks, Engineer Wm. Clucas; Gilbert, Capt. E. Dyle, Engineer W. G. Tilton; Grecian, Capt. Andrew Hanson, Engineer A. J. Armson; Griffin, Capt. E. L. Sawyer, Engineer J. B. McDermid; Harvard, Capt. C. D. Secord, Engineer E. Egan; Hill, Capt. George Bell, Engineer E. S. Stoddard; Houghton, Capt. E. M. Smith, Engineer J. W. McEachren; Joliet, Capt. W. E. Stover, Engineer B. Cassidy; Lafayette, Capt. D. P. Wright, Engineer L. Walder; LaSalle, Capt. Thomas Wilson, Engineer D. Milloy; Linn, Capt. George Banker, Engineer H. Dupont; McDougall, Capt. John Nahrstedt, Engineer J. Inman; Malietoa, Capt. A. C. Chapman, Engineer T. Treleven; Manola, Capt. H. G. Harbottle, Engineer A. Rivard; Maricopa, Capt. John Parke, Engineer F. A. Smith; Marina, Capt. A. C. Smith, Engineer George Lynn; Mariposa, Capt. James Burr, Engineer H. T. McLeod; Mariska, Capt. H. Kerr, Engineer J. B. Miller; Maritana, Capt. J. R. Parker, Engineer J. J. Norcross; Martha, Capt. F. C. Watson, Engineer H. E. Schmidt; Mesaba, Capt. C. A. Weitzman, Engineer J. H. McGleam; Mataafa, Capt. R. F. Humble, Engineer Wm. Most; Mather, Capt. C. S. Boyce, Engineer F. J. Spencer; Matoa, Capt. H. Gegoux, Engineer E. J. Rae; Maunaloa, Capt. J. Laframboise, Engineer A. McKenzie; Morse, Capt. John Lowe, Engineer E. W. Fox; Murphy, Capt. James Leisk, Engineer Wm. Densmore; Neilson, Capt. Oscar Olsen, Engineer J. Wilson; Palmer, Capt. J. H. Clapp, Engineer J. H. Cunningham; Poe, Capt. W. C. Her, Engineer F. Warning; Perkins, Capt. W. H. Moody, Engineer H. Annett; Princeton, Capt. A. P. Chambers, Engineer W. L. Campbell; Queen City, Capt. C. Gegenheimer, Engineer E. H. Learned; Reusselaer, Capt. S. C. Allen, Engineer I. Marshall; Rockefeller, Capt. P. A. Peterson, Engineer T. Kelley; Roman, Capt. George Randolph, Engineer Wm. Dornbrook; Saxon, Capt. George H. Bowen, Engineer R. Mastin; Shaw, Capt. John Burns, Engineer E. J. Fitzgerald; Siemens, Capt. M. K. Chamberlain, Engineer D. McVicar; Stephenson, Capt. W. B. MacGregor, Engineer S. W. Armstrong; Superior, Capt. ———, Engineer G. Ingham; Superior City, Capt. F. J. Crowley, Engineer M. B. Sturtevant; Trevor, Capt. J. A. Ferguson, Engineer H. Firby; Van Hise, Capt. Fred Hofman, Engineer J. McLaughlin; Watt, Capt. W. J. Hunt, Engineer A. W. Armon; Wawatam, Capt. J. C. Bell, Engineer W. D. Killett; Wolvin, Capt. A. R. Thompson, Engineer J. W. Parr; Zenith City, Capt. H. Culp, Engineer A. Jackson. Barges—Bell, Capt. C. Mulholland; Bryn Mawr, Capt. George B. Kendall; Carrington, Capt. J. H. Denner; Corlies, Capt. J. Y. Sprowell; Fritz, Capt. S. J. Millen; Holley, Capt. H. T. Kelley; Jenney, Capt. A. Nordahl; Krupp, Capt. Fred H.

Rae; Malta, Capt. David Bouille; Marcia, Capt. George Maloney; Manda, Capt. H. Harris, Jr.; Martha, Capt. W. F. Allen; Magna, Capt. H. M. White; Maida, Capt. O. W. Holdridge; Maia, Capt. W. H. Dick; Manila, Capt. H. Walper; Madeira, Capt. J. H. Disette; Marsala, Capt. Louis Leonard; Nasmyth, Capt. Donald Graham; Roebing, Capt. H. M. Save-land; Smeaton, Capt. J. F. Gray; Thomas, Capt. David Williams; 117, Capt. George Foster; 118, Capt. Louis Larson; 130, Capt. Fred Kirk; 131, Capt. Alfred Beaupre; 132, Capt. Robert Thompson; 133, Capt. Charles Thompson; 134, Capt. A. S. Hand; 137, Capt. Wm. McDonald.

Richardson, W. C., Cleveland, O.: Steamers—W. C. Richardson, Capt. Thomas Wilford, Engineer James Falconer; Roumania, Capt. Wm. Hagan, Engineer James Bennett; Samuel Mitchell, Capt. John H. Babbitt, Engineer A. C. Bowen; J. H. Wade, Capt. Phillip H. Smith, Engineer John McMonagle; J. H. Devereux, Capt. C. C. Mason, Engineer Thomas Shannon; J. H. Outhwaite, Capt. Ralph H. Nutting, Engineer G. H. Miller; Iroquois, Capt. Enos J. Burke, Engineer L. L. Bowen; Iron King, Capt. James Ross, Engineer Albert E. Bury; Wm. Edwards, Capt. Charles Ahlstrom, Engineer Moses Blondin. Schooners—Chickamauga, Capt. Harry W. Phillips; Crete, Capt. Henry Larsen; Mary B. Mitchell, Capt. John McKeighan; Iron Queen, Capt. D. A. Maynes; Golden Age, Capt. D. H. Stalker.

Tomlinson, G. A., Duluth, Minn.: Steamers—James E. Davidson, Capt. F. A. Pick, Engineer Frank Schwartz; Hoover & Mason, Capt. W. D. Ames, Engineer ———; Sylvania, Capt. J. W. Ehrhart, Engineer T. H. Welsh; Socapa, Capt. ———, Engineer Wm. Millington; Ball Brothers, Capt. D. P. Craine, Engineer A. R. Fortier; Sahara, Capt. W. G. Maltby, Engineer F. A. Steadley; Saxona, Capt. George W. McCullough, Engineer F. N. Valdwinn; Sinaloa, Capt. C. Z. Montague, Engineer W. J. McAuliffe; Sonoma, Capt. W. C. Brown, Engineer R. J. Close; Yosemite, Capt. A. H. Reed, Engineer W. H. Ballard; Kensington, Capt. Frank Lewis, Engineer F. T. Goodwin; Sonora, Capt. C. C. Tousley, Engineer Byron Freeman; Sultana, Capt. W. B. Todd, Engineer W. M. McCarron.

Union Steamboat Line, Buffalo, N. Y.: Steamers—Star-rucca, Capt. James R. Gibson, Engineer Alex. A. Brown; Ramapo, Capt. F. W. Hoehn, Engineer Henry Johnson; Chemung, Capt. J. A. McDonald, Engineer Nelson Johnson; Owego, Capt. F. W. McQuilkin, Engineer J. C. Tenant; Tioga, Capt. Jno. C. Clark, Engineer Wm. Hayes; Binghamton, Capt. F. R. Gebhard, Engineer John Caul; Rochester, Capt. ———, Engineer E. M. Carpenter; New York, Capt. ———, Engineer E. T. Jenkins.

Canadian Lake & Ocean Navigation Co., Toronto, Can.: Steamers—Turret Chief, Capt. M. McPhee, Engineer Robert Dugid; Turret Cape, Capt. A. McIntyre, Engineer W. H. Durham; Turret Court, Capt. James Black, Engineer C. J. McSorley; J. H. Plummer, Capt. G. W. Mackey, Engineer R. Chalmers; A. E. Ames, Capt. E. L. Stephen, Engineer S. Gillespie; H. M. Pellatt, Capt. G. A. Brian, Engineer Wm Byers.

Wilson Transit Line, Cleveland, O.: Steamers—Henry W. Oliver, Capt. W. W. Dawley, Engineer Frank C. Stoerber; Capt. Thomas Wilson, Capt. J. G. Wood, Engineer Fred Harmon; Andrew Carnegie, Capt. Daniel Bue, Engineer James F. Derrig; W. D. Rees, Capt. E. R. Morton, Engineer Charles V. Annable; Yuma, Capt. C. H. Francke, Engineer John Heinkelmann; Spokane, Capt. J. McArthur, Engineer W. E. Donovan.

Pickands, Mather & Co., Cleveland, O.: Steamers—Amasa Stone, Capt. G. B. Mallory, Engineer A. Arnold; Victory, Capt. D. H. Mallory, Engineer Edgar Arnold; Kearsarge, Capt. James McNeil, Engineer A. A. Manion; Appomattox,

Capt. Frank Hebner, Engineer H. A. Woods. Barge—Constitution, Capt. Harry Howard; Santiago, Capt. P. Cartwright.

Hutchinson & Co., Cleveland, O.; Steamers—Wm. A. Paine, Capt. W. P. Benham, Engineer P. F. Lyons; Martin Mullen, Capt. S. B. Massey, Engineer W. J. Swaine; J. T. Hutchinson, Capt. James Murphy, Engineer George Blauvelt; City of Glasgow, Capt. J. M. Shackett, Engineer Anton Rudd. Schooner—Abyssinia, Capt. T. K. Woodward.

Minneapolis, St. Paul & Buffalo Steamship Co., Buffalo, N. Y.: Steamers—Minneapolis, Capt. Walter Robinson, Engineer D. J. McMillan; St. Paul, Capt. Peter Thompson, Engineer Henry Stone; Huron, Capt. Neil Andersen, Engineer Clinton

Capt. W. R. Neal, Engineer Charles Pierce. Schooners—Scotia, Capt. Wallace Allen; Plymouth, Capt. Charles Jorgenson.

D. R. Hanna, mngr., Franklin Trans. Co., Cleveland, Ohio: Steamers—Wm. F. Fitch, Capt. B. W. Landfair, Engineer Grant Donaldson. Schooner—A. Maitland, Capt. Hosner.

Manistique, Marquette & Northern Ry. Co., Milwaukee, Wis.: Steamer—M. M. & N. No. 1, Capt. F. W. Robertson, Engineer J. R. Taylor.

Brainard, W. S., Toledo, O.: Steamer—Cherokee, Capt. James Mara, Engineer J. S. Robertson. Schooner—Chippewa, Capt. John Davidson.



UNCLE SAM: Excuse me, sir, but haven't you forgotten something?

C. Folkerts; Wm. Castle Rhodes, Capt. P. Dowdell, Engineer Guy A. Hemenger.

Ann Arbor R. R. & Steamship Line, Toledo, O.: Steamers—Ann Arbor Ferry No. 1, Capt. A. L. Larson, Engineer B. Aldrich; Ann Arbor Ferry No. 2, Capt. C. Frederickson, Engineer F. Russell; Ann Arbor Ferry No. 3, Capt. F. A. Robertson, Engineer T. J. Harkins.

Michigan, Indiana & Illinois Line, Chicago, Ill.: Steamers—John Oades, Capt. H. M. Boyce, Engineer Eugene Hidden; Marion, Capt. H. J. Nelson; Minnie E. Kelton, Capt. J. A. Johnson; Normandie, Capt. Andrew Olson, Engineer Frank P. Snyder.

Mueller Co., Wm., Chicago, Ill.: Steamer—Mueller, Capt. Edward Fitch, Engineer G. G. Randall. Schooners—Butcher Boy, Capt. Harry Woerpel; Belle Brown, Capt. Max Delatree; Richard Mott, Capt. Wm. Powers.

Gray Transportation Co., Cleveland, O.: Steamer—Arizona,

Adams, Thomas, mngr., Monroe Trans. Co., Detroit, Mich.: Steamer—George L. Craig, Capt. D. J. Duncanson, Engineer S. C. Staley.

The Volunteer Transit Co., Cleveland, O.: Steamer—Charles Beatty, Capt. John Milne, Engineer Gilbert McPhail. Adams Transportation Co., Detroit, Mich.: Steamer—Thomas Adams, Capt. F. B. Cody, Engineer T. J. McCabe.

Robertson, George, Grand Haven, Mich.: Steamer—Sidney O. Neff, Capt. Antony Greilick, Engineer Frank Greilick.

Willoughby, Capt. W. J., Goderich, Ont.: Steamer—Benton, Capt. W. J. Willoughby, Engineer Richard Baxter.

White, Guy, N. Tonawanda, N. Y.: Steamer—Edward Smith, Capt. Charles D. Miller, Engineer Charles C. Smith.

Sandusky Lumber & Box Co., Sandusky, O.: Steamer—Linden, Capt. J. H. Warwick, Engineer R. A. Campbell.

Seither Transit Co., Cleveland: Steamer—G. J. Grammer, Capt. Joseph A. Powell, Engineer John Goulden.

# Merchant Marine League

The Merchant Marine League of the United States which was organized in Cleveland a few months ago is making commendable progress and shows the deep interest which is taken in shipping matters by merchants and manufacturers throughout the entire country. The league has met with favor in all parts of the country and gives promise of becoming the moving force of the nation in behalf of the development of shipping in the foreign trade before the next session of congress. Its membership is representative of the leading industries of the country and enrolls in the list men of national prominence. It has members now in eighteen states and has selected vice presidents for four of the states. Vice presidents will be selected for each state as the membership of the state justifies it. Vice presidents selected so far are George H. Barbour, vice president and general manager Michigan Stove Co., Detroit, Mich., vice president for Michigan; O. P. Letchworth, president Pratt & Letchworth Co., Buffalo, vice president for New York; D. B. Meacham, Rogers, Brown & Co., Cincinnati, vice president for Ohio; George E. Bartol, president the Bourse, Philadelphia, vice president for Pennsylvania.

The following letters are merely examples of hundreds which have been received by the league:

"We take pleasure in enclosing our application and check for membership to your association and this we do as citizens and patriots."

Boston, Feb. 27. S. A. Woods Machine Co.,  
H. F. Woods, general manager.

"To my mind this effort which you and your friends are making for the rehabilitation of the merchant marine is an exceedingly commendable one and I desire, if possible, to add my little mite to the good work. If there is any manner in which I can serve you in this matter please advise me."

March 4. JAMES S. STIRLING,  
Samuel L. Moore & Sons Corporation,  
Elizabethport, N. J.

"Please find application for membership with check accompanying. I trust that there may be a large acceptance of your proposition on the part of manufacturers and all loyal to America."

March 2. FRANK N. LOOK,  
Florence Manufacturing Co.,  
Florence, Mass.

Mr. George Harrison Barbour, the vice president of the Merchant Marine League of the United States for Michigan, was born at Collinsville, Conn., on June 26, 1843, and is



MR. GEORGE HARRISON BARBOUR.  
Vice President for Michigan of the Merchant Marine League  
of the United States.

descended from pioneer New England stock which was founded by Thomas Barbour who arrived in America from England on June 20, 1634. The Barbour family, ever since that date, has been prominently identified with the commercial and political affairs of Connecticut, where they have resided continuously until this time. The younger members of the family, however, of late years have, as a rule, removed to and settled in Detroit, where the present active branch resides.

At an early age the subject of this sketch found it necessary to lend his assistance to the business affairs of his father, and during the period when most youngsters of his age were actively engaged in the pursuit of education and pleasure, he devoted himself to procuring such education as the facilities at hand afforded, and to business. His father conducted a general merchandising enterprise, and at his death was succeeded by his son, George. Shortly thereafter, his brother-in-law, J. Earl Goodman, was admitted

as a general partner; and in 1871, when The Michigan Stove Co. was organized, and the office of secretary was tendered to him, Mr. Barbour promptly accepted the offer, disposed of his interests in the Collinsville business, and removed to Detroit, where he has since resided. Much of the success of The Michigan Stove Co. is due to his indefatigable efforts and aggressive methods. This company has for many years been recognized as the largest and most progressive of its kind in the world.

Mr. Barbour has become associated in the interim with many prominent commercial and banking organizations, and possesses the reputation of being most conservative and acute in all matters relating to these branches. As a banker he is widely and favorably known, and has been conspicuously successful; is an old school so-called "Cleveland Democrat"—believes in protection and sound money and conservatism in all matters pertaining to national government. He has not, however, been an active politician, nor a candidate for any office, except once when during his absence from home he was nominated, and subsequently elected, on the Democratic ticket, a member of the Board of Aldermen from the First ward, which normally carried a Republican majority of 175. Upon taking his seat in this body, he was made president of the board.

Mr. Barbour was very active in organizing the Detroit exposition, which in its day was most successful and a great credit to the city and its promoters. He was the first president of the Detroit Board of Commerce, and has, in fact, been more or less prominent and active in the organi-



zation and up-building of all of the business and commercial interests of the city. He was the first president of the Michigan Manufacturers' association, and has always been active in the affairs of the National association of Manufacturers, of which he was in 1902 chairman of the legislative committee, in which latter capacity he appeared several times before various committees of the United States senate in connection with pending legislation pertaining to the regulation of manufacturers, and more especially in connection with the consideration of a measure then pending in reference to making eight hours a legal day's work for labor.

Mr. Barbour was a member of the National commission of the World's Fair held in Chicago in 1893, and was chairman of the Michigan commission to the Pan-American Exposition in Buffalo in 1901. In the latter capacity he enjoyed the unique distinction of returning to the state treasury, after the exposition was over and all expenses of the commission paid, a sum something in excess of ten thousand dollars of the original appropriation of fifty thousand dollars. It was admitted at the time to be a procedure entirely without precedent.

Mr. Barbour is at present first vice president and general manager of the Michigan Stove Co., president of the Ireland & Matthews Mfg. Co. of Detroit, director of the People's Savings Bank, vice president of the Dime Savings Bank, director of the Union Trust Co., director of the Michigan Fire & Marine Insurance Co., and vice president and director of the Board of Commerce, all of Detroit.

### WE MUST HAVE SHIPS

Editor Marine Review: Our need of American ocean-going steamships before we can materially increase our Central and South American commerce is further evidenced by some facts sent us by Consul General Winslow of Guatemala City, who says: "Ocean freights are discriminated in favor of European shippers, notwithstanding the great difference in distance. Freight on general merchandise is \$35 per ton to New York and only \$25 per ton to London and Hamburg. Shipments of hides are charged \$30 per ton to New York and \$20 per ton to London and Hamburg. The rate on coffee is \$15 and \$13.50 per ton respectively. On sugar the rate is the same to the ports mentioned. The rates from Europe to Guatemala are lower than from Guatemala to Europe. This works against our exports to Guatemala, as freightage is a heavy item on flour, groceries, salt, machinery, hardware and lumber, which form a large part of Guatemala's imports.

Schenectady, N. Y.

WALTER J. BALLARD.

Capt. Harris W. Baker of Detroit has succeeded in raising the sunken steamer Iron Duke which went to the bottom of the river at Charlotte, New York, last fall after being partially burned. The underwriters had abandoned the Iron Duke, but after an examination Capt. Baker concluded that he could raise her. The job was a difficult one as the rails of the boat were under water and covered with ice nearly 2 ft. thick. This was cut away sufficiently to allow the divers to descend and a cofferdam was constructed about her. The pumps were then started and the vessel raised. The Iron Duke was formerly owned by Corrigan, McKinney & Co. of Cleveland.

A Shanghai firm has bought the steamer Gaelic for the purpose of conveying Russian refugees from Port Arthur to Odessa. About 5,000 refugees from Port Arthur are housed in a cotton-mill at Shanghai waiting for transportation to Russia. The captain and other officers of the Gaelic will return to England. Her surgeon will join the steamer Coptic.

### LIVERPOOL SHIPPING LETTER

Liverpool, Feb. 27.—The International conference of Ship Owners sitting at Copenhagen has unanimously adopted the following resolution: "The steamship owners representing the leading association, as well as numerous private firms in Great Britain, Germany, France, Spain, Holland, Belgium, Sweden, Norway, Russia, Finland and Denmark assembled in conference at Copenhagen, unanimously declared in favor of the necessity for the immediate formation of an International association of Ship Owners interested in the trade of the Baltic, the North sea, and the White sea. They request the Danish Steamship Owners' association to take the necessary preliminary steps for the formation of the association at the meeting to be held in June next." The conference which represented 4,127,000 tons register has doubtless been encouraged in its action by the great success which has attended the recently formed International union of Sailing-ship Owners.

The launch of the Cunard turbine steamer Carmania by Messrs. John Brown & Co. at Clydebank on Tuesday, last, Feb. 22, was deprived of much of its interest by reason of the fact that it followed so closely after the trials of the sister ship Caronia. As to the vessel it is unnecessary to describe her fully. She is an exact duplicate of the Caronia being 678 ft. in length, 72 ft. in breadth, 52 ft. in depth, of 29,800 tons displacement, and 21,000 tons gross register. Experts declare the Carmania and Caronia to be a great advance in marine architecture, and the finest samples yet produced. The Carmania's details are most up-to-date, and despite launching weight, being over 13,000 tons, she glided into the water within 50 seconds. She was originally intended to be fitted with ordinary reciprocating engines like her sister ship Caronia, but the Cunard company, with a view to securing data for the 30,000 tonners building at Clydebank and on the Tyne, decided to fit the Carmania with the newer method of turbine propulsion. She is designed to give a continuous speed of 18 knots, but a higher rate is expected. She will have a carrying capacity of 12,000 tons, besides accommodation for 2,650 passengers, and 450 officers and crew. Further she has been constructed to meet government transport requirements, and to act as an armed cruiser. At the lunch which followed the launch, Mr. John Ellis (chairman of Messrs. John Brown & Co., builders), said the Carmania would afford a unique example of ascertaining the merits and demerits of turbine propulsion as compared with reciprocating engines. With the view to show the magnitude of the task of fitting on such a large scale turbine engines, he mentioned that in the Carmania's turbines, there were no fewer than 1,250,000 small brass blades, which formed the propelling mechanism. These had all to be set and fixed separately, so that Mr. Bell, engineering manager at Clydebank, would have some time of considerable anxiety before the machinery was completed. He affirmed that the energy and enterprise of the Cunard company had won for them the undoubted claim of premier shipping concern of Britain.

In this connection the Carmania's sister ship Caronia sailed from Liverpool to New York on her maiden trip on Saturday. It is claimed for her that while she is not the largest ship afloat, she is the biggest ship of her speed, and the fastest ship of her size. On Friday she was thrown open for inspection in aid of the hospital funds, and it is roughly estimated that between 5,000 and 6,000 persons, many from distant parts of the country, went on board.

Apropos of turbines, the announcement is just made that the Great Western Railway Co. has just contracted for the construction of three turbine steamers to be engaged in the company's Lishguard & Rosclare service. The steamers,

which are almost exclusively for the passenger trade, will have a speed of  $22\frac{1}{2}$  knots, and will be 350 ft. long, and 41 ft. broad. Messrs. Cammell, Laird & Co., Ltd., of Birkenhead, Liverpool, will have the construction of one of the vessels, and the other two will be built by Messrs. John Brown & Co., Clydebank. All three vessels are being designed by Mr. Charles T. Ramsay, consulting engineer and naval architect of Liverpool.

The method of accurately estimating the horse power of marine steam turbines is one which cannot as yet be definitely settled, nor can any formula, which would be final, be drawn up for this purpose until engineers have had a much greater experience of the new engine than they have yet had. Messrs. Denny Brothers of Dumbarton have a scientific method of their own for arriving at the horse power of turbines, and Lloyd's Register have now also drawn up a formula for the same purpose. This latter is based on a comparison of the work done by turbines with that done by reciprocating engines producing similar results, and although it serves present purposes it is by no means final. The rule has been applied to the Lhasa, one of the four turbine steamers built by Messrs. Denny Brothers to the order of the British India Co., and what is practically the first turbine steamer classed with Lloyds. Under their formula she has been credited with 450 R. H. P., though how it works out nominal is another matter, while as to indicated there seems to be at present no way of arriving at it with accuracy. Most of the turbines yet built have been classed with the British Corporation Register, but they have so far no method of measuring the horse power. All they do is to change dues by the heating surface of the boilers and therefore do not absolutely require to know the power, though they will insert it in their register when it is available.

The Anchor Line, I learn, has definitely decided to fit their new steamers Caledonia and Columbia with installations of wireless telegraphy, and with the inaugural sailings of these magnificent steamers the system will be fitted. As an earnest of the company's intention to be thoroughly up-to-date, the wireless installations will consist of the long distance apparatus, the capabilities of which are now well known. The first sailing will be that of the Columbia, March 11, followed by the Caledonia a fortnight later. Messrs. Henderson, I understand, contemplate fitting some of their first-class steamers already engaged in the Atlantic passenger trade between the Clyde and New York, and doubtless this will depend upon the success of the present enterprise.

The steamer Aragon, which was launched at Belfast on Thursday, makes an epoch in the history of the Royal Mail Steam Packet Co., one of the oldest and now recognized as one of the most progressive of British steamship lines. In addition to being the finest vessel in the Royal Mail Co.'s fleet, the Aragon will be the largest and finest steamer engaged in the South American trade. Her dimensions are: Length, 527 ft. 6 in.; beam, 60 ft., with a gross register of about 10,000 tons. The Aragon is designed to carry a large quantity of cargo but passenger accommodation on the most sumptuous scale is her specialty, a point deserving particular mention being that the staterooms are on deck, an improvement that will appeal strongly to intending voyagers. She is an eloquent tribute to the high hopes entertained by the company of the future of the South American trade and cannot fail to meet with unqualified approval of the traveling public and merchants for whose comfort she has been built. The Aragon will take up her position in the South American mail service about the end of June and will start on her maiden voyage on July 14. After the launch the guests were entertained at lunch at Ormiston, the residence of the Right Hon. W. J. Pirrie, chairman of Harland & Wolff, Ltd.

The first fruits of the recent agitation against the Suez

Canal Co. is to be seen in a new steamship service about to be inaugurated. Owing to the yearly increasing shipments of hessians and jute goods from Calcutta to the Argentine, Messrs. Weddel, Turner & Co. (the Lion Line, Ltd.), have under contract with the principal shippers arranged to put on during the season a monthly service of steamers via the Cape. Hitherto the goods have been shipped from Calcutta to Liverpool and transhipped to the River Plate. This means a diversion of many thousands of tons of cargo from the Suez canal, whose charges on the steamers equal \$1.25 per ton of jute. The Calcutta-Plate trade will be stimulated by the cheaper rate and quicker service accorded via the Cape.

The Newcastle-on-Tyne correspondent of the Shipping Gazette says the orders for new tonnage which were placed last month have had a marked effect on the Cleveland steel trade. Steel plate and angle makers have booked big contracts for material and it is significant of trade improvement that the syndicate has decided to restart the Stockton Malleable Works, which have been closed all the winter. The steel works of Messrs. Bell Bros. (Ltd.), at Port Clarence has also been reopened after a considerable spell of idleness, due to alterations which have been in progress in the plant. These works are now finely equipped for producing steel direct from Cleveland ironstone without foreign ores and are expected to play a large part in the future of the north country steel trade.

The Cunard Line have sold the Aurania, one of their steamers well known in the Atlantic trade, to an Italian company. The price paid is said to be about \$75,000.

#### NEW SCHERZER ROLLING LIFT BRIDGES

The second Scherzer rolling lift bridge for the Central Railroad Co. of New Jersey across Newark bay, N. J., is rapidly nearing completion. This bridge is being erected in its closed position and constantly carries the railroad traffic without interruption. During the past month Scherzer bridges were completed and placed into active service at Eighteenth street, Chicago; South Michigan street, Buffalo, N. Y.; Swale river, England, for the South Eastern & Chatham railway. During the present month the following additional Scherzer bridges will be completed and placed into active service:

Union avenue, Third avenue and Hamilton avenue bridges, across Gowanus canal, Brooklyn; also the long span double-leaf Scherzer bridge at Manhattan avenue, across Newtown creek waterway, Brooklyn. The double-track, single-leaf, long span Scherzer bridge recently completed and placed into service for the Newburg & South Shore railway, Cleveland, O., has attracted wide attention because of its simplicity and economy. It is being duplicated by the Baltimore & Ohio railroad at Cleveland at an adjacent site, where a center-pier swing bridge is being removed and replaced. Orders for a number of additional single, double and multiple track bridges of similar form have been booked by the Scherzer company, construction contracts to be let this year.

The contract for the construction of the Scherzer bridge for the Buffalo & Susquehanna railroad and the Pennsylvania railroad at Buffalo has recently been awarded and work is now in progress. Construction work is also in progress on Scherzer bridges at 22d street, Chicago; Harrison street, Chicago; Flushing, Long Island; Genesee avenue, Saginaw; over the Suir river, Ireland; Spaarne river, Holland; Saugus river, Boston; Malden river, Boston; West river at Kimberly avenue, New Haven; four-track railroad bridges for the New York, New Haven & Hartford Railroad Co. at Cos Cos, Conn., Westport, Conn., and also across the Housatonic river, Connecticut. Among the foreign contracts on which the Scherzer company is now working is a large highway bridge across the Ekaterinhofka river, St. Petersburg; also a deck bridge of arched outline, forming the movable portion of a long bridge connecting Barrow-in-Furness with Walney island, England.

## ANOTHER INJUSTICE TO AMERICAN SHIP YARDS

By Frank Van Vleck, Ph. D

A further defect of our American laws relating to shipping stands revealed by an accident on the high seas. Without definite legislation on the subject it has been held that vessels and machines engaged in dredging were not subject to the code of the United States regulations applying to shipping and decisions in admiralty have usually upheld the view. Consequently owners or operators of dredgers have rarely or never been called upon to comply with all the rules and requirements applying to sea-going ships. The very nature of their work has rendered compliance with port and harbor regulations almost unnecessary, likewise have considerations regarding the status of licensed officers been abandoned, while a registry of these machines or dredges to determine their flag has been regarded almost as whimsical. Yet it is just this indeterminateness which has recently resulted in injury to American ship yards. American contractors have been purchasing sea-going dredgers in foreign ports, steaming them to this country—vessels without a flag, manned from cabin to fore-castle with foreign crews—and then in an American port engaging in deepening American harbors for coin paid out by the American government. Is it not choicest encouragement for foreign enterprise, even if the wily contractor does thereby count more profit to his account? Witness the following account of a marine disaster, as extracted from the daily press. Between the very lines of the harrassing details we learn even the manner of the perpetration of the injustice to American interests:

Rivalling in its details of intense suffering the most harrowing story of any shipwrecked mariner of fiction is the tale brought to port by three survivors of the crew of the steam-dredge *Texas*, who arrived yesterday on the *Etruria* of the Cunard Line. Adrift with ten others in an open boat for nearly thirteen days without food or fresh water on the sixth day, and picked up by a schooner when all save one had gone mad is the story of the disastrous voyage. The only American among the crew of thirty-two men engaged at Hamburg early in December to bring the *Texas*, just built at Dantzie, to Galveston, was Captain Minot of New York.

The *Texas* was a little over 200 ft. long and of about 40 ft. beam. She was built of steel with twin screws. On the second day out from Dantzie the *Texas* lost her starboard propeller and had to put into Kiel for repairs. Going down the English channel her pumping apparatus got out of order and this necessitated a stop at Southampton. Leaving the English port on Dec. 18, the vessel was so buffeted by wind and waves that the sixth day out found it still nearly 300 miles from the Azores. On the evening of that day the vessel began suddenly to settle at the bows, and it was discovered that a plate had been ripped loose. The water was pouring in so rapidly that the ordinary steam pumps could not cope with the emergency, and a big suction apparatus, which formed part of the vessel's equipment, was put to work. Sixty tons of coal were thrown overboard and the hold was emptied enough to enable repairs to be started, when the apparatus failed. Just then the chief engineer discovered another leak under the engine room through which water was rushing fast. Capt. Minot gave the order to lower the boats. This was at ten o'clock, when a strong northwester and a high sea combined to make such an undertaking almost as perilous as sticking to the ship.

A vessel purchased cheaply in Germany, built evidently on the plan of not "how well" but "how cheap." The newspaper accounts speak volumes even before the Lloyds' surveyor is called in. It is understood that this is not the only sea-going dredge built or building to American order in foreign yards—and this certainly will not be the last, unless proper steps are taken to prevent this improper slipping away of American work, through a mal-interpretation of the laws. Let us, therefore, with the interests of the American ship yard and the American employe well in our heart, look for a remedy.

Legislation can avail much. Congress by a resolution can stamp out this trouble, but is it necessary to go to congress? Why not first apply the laws in sight?

Any one or all of the following methods may bring about the desired change:

1. Application of registration and documentation.
2. Payment of duty on a manufactured product.
3. Specification by war department against employment of foreign-built vessels, machinery, etc.

Examining these three remedies in detail:

1. There is no reason under the present provisions of the revised statutes why dredging vessels, propelled by their own motive power or capable of being so propelled or handled should be exempt from the necessities of all the regulations requiring such vessels to take out regular documents of registration and all other nautical papers, nor should the status of such a vessel in admiralty jurisdiction be thereby changed. Let us glance at the very inclusiveness of the present law.

"The word vessel includes every description of water craft or other artificial contrivance used or capable of being used as a means of transportation by water."

If this law means anything it means that sea-going dredges are included—"capable of being used as a means of transportation by water." What their transportable material is cannot be taken cognizance of under the law—even although in this case it is not a cargo strictly speaking but mud. Therefore the secretary of commerce and labor by a simple regulation to his inspectors can legally require that all these vessels be brought within the jurisdiction of the United States laws of documentation.

2. If the dredging vessel is so built that it cannot be used as to be "capable of being used as a means of transportation," i. e., a hulk or float with machinery aboard incapable of any self movement (and there are but few such) then this float is not a vessel under the law and cannot be documented in any manner, save as laws apply to floats, barges, etc. If this float is not a vessel, it is therefore an "article of manufacture" and should be compelled to pay the usual customs duty, if it is built in a foreign port and towed into an American port—40 per cent or so, ad valorem or whatever might be held to be the proper rate applying to a large manufactured article built mainly of steel and filled with high-grade machinery. Therefore cannot the secretary of the treasury by proper instructions to customs collectors bring into the treasury a sum equal to the duty on this class of floating property?

3. A simple clause inserted in the specifications issued by the war department for dredging to be contracted for under the river and harbor acts, "That all dredging machines, floats and vessels shall be of American manufacture" would at one stroke throw out of contemplation by contractors the use of foreign-built dredges. Such clauses of a similar import have for many years appeared in all navy specifications, with the result that there is not a scrap of foreign material on an American naval vessel. The army in the quartermaster's department issue a similar specification, and for the Pacific coast even go so far as to favor articles of Pacific coast manufacture. As all river and harbor improvements are directly referred to the engineer department of the army, the war department can therefore practically control what class of dredger shall engage in its work. Even where dredging is done by a municipality, as is understood to be the case with certain of the harbor improvements at Galveston, the endorsement of all the harbor specifications must be examined and approved by the war department. Here the war department can call the attention of the municipality to the fact that specifications to be acceptable should contain the "American dredge" phrase.

The only case wherein the war department might not have jurisdiction would be where dredging was conducted on land wholly within the confines of the state and never before subject to navigation—such as the digging of a canal through land by a private corporation such as a railroad. This latter

special case is, however, so rare that there is not at this time special reason to consider it.

Therefore the secretary of war has it within his power to require the specifications for dredging to contain the phrase "of American manufacture."

Would it not therefore appear that all that is necessary is to apply the laws we already have on the statute books, rather than to complicate the problem by making special laws to fit the particular case.

The honorable commissioner of navigation, Eugene T. Chamberlain, in his annual report has directed attention to the same reconciliation of our laws to this special case of dredgers. The reference is made that the supreme court of the United States in the case of the yacht *Conqueror* held that a foreign built vessel, purchased by a citizen of the United States and brought into the waters thereof, is not taxable under the tariff laws of the United States. As this decision stands, therefore does not this ruling drive this dredger style of vessel into the category which it is sought to have covered by paragraph 1? In short, the dredger is a vessel within the meaning of the law. If a vessel, then the United States vessel laws apply. The supreme court decision applies only to vessels—when under admiralty the dredger ceases to become a vessel but is a floating piece of machinery—then do not the customs laws apply as shown in paragraph 2? Again, in any case, cannot the war department step in and refuse employment to the foreign-built vessels or machines?

As a special instance of the evasion of United States laws the commissioner of navigation also cites the case of the dredger *Holm*, now in employment in the harbor of Galveston. This vessel, although built in Holland, yet was designed by an American engineer, and is owned by an American corporation. The vessel is not only capable of self-propulsion, but by virtue of being fitted with large self-dumping hoppers can take its own dredged material and proceed into deep water with it. After her completion in Holland she crossed the Atlantic under her own steam, entering the port of Galveston last summer. On arrival it appears she became nearly scot free from the applications of any laws, a paltry tonnage tax of 50 cents per ton being only levied, and in addition 50 cents per ton for "light money," being rated as "a vessel of the United States," plus the usual 6 cents on a vessel from Europe. Thus on her 224 net tons the government realized only \$237.44. It has been claimed this entrance and operation of the dredge is contrary to the provisions of the law applicable to coastwise traffic being restricted to vessels carrying the American flag. Yet in this case, as the dredge never visits another port and always returns to its point of departure, the theory of coastwise traffic becomes untenable.

A grave and continuous injustice will be committed against American ship yards and American seamen if foreign-built dredges like the *Holm* can enter American ports and by the payment of a trifling alien tonnage tax of \$1.00 can come to anchor, dredge and move in and out, doing the work which all should concede should be done by Americans.

Therefore, should we not demand that the laws in sight should be applied?

#### ROBERTS SAFETY WATER-TUBE BOILERS

The Roberts Safety Water Tube Boiler Co.'s works which are located at Red Bank, N. J., are again beginning to experience their usual pre-spring rush and in all probability will shortly be running day and night as has been customary with them for the last ten years. The more recent orders which this company has closed include one boiler for the Standard Boat Co., one for the Vancouver Ship Yard Co., one for Carl Hirsch & Co. of New Orleans, one for George Foster Peabody, one for the Vinalhaven & Rockland Steamboat Co., a special 5½ ft. by 9 ft. for Henry Steers, Inc., one for the

Point O'Woods Navigation Co., one for H. H. Pike & Brother, and two large boilers for the E. W. Bliss Co. of Brooklyn.

They have also recently shipped a Roberts boiler to T. J. Shields, Nicaragua, C. A., also to Donagan & Swift, a special one to the Lecouver Press Co., three to the Electric Launch Co., one to Maj. Lansing H. Beech of Detroit, and also the big boiler for the new vessel building for the United States supervisor of the harbor of New York at John H. Dialogue & Sons yard, Camden, N. J. This is the seventh boat of the supervisor's fleet which has been equipped with Roberts safety water tube boilers, and it would appear that the repeated orders from a government department constitutes the best kind of an endorsement.

Incidentally it might be stated that similar conditions prevail with the United States treasury department which has equipped about fifteen of its revenue cutters with the Roberts safety water tube boiler, having placed repeated orders with the Roberts company, covering a period of over ten years. Among the prominent ship builders who own yachts equipped with Roberts water tube boilers are Mr. Lewis Nixon, Mr. C. B. Orcutt, Mr. Hyde, Mr. E. P. Morse, Mr. Scott, Mr. Craig and many others. The Roberts safety water tube boiler has been in use for a great many years in vessels of the navies of the United States of America, United States of Columbia, Spain and Mexico.

It is possible that the adoption of steam turbines will lend an even greater impetus to this industry inasmuch as the Roberts boiler has proven itself to be superior to anything else as a generator of steam of a quality to give the best results in conjunction with turbines. The Roberts boiler can deliver steam superheated 150 deg. Fahr. in excess of the temperature due to the pressure, and it does this without the addition of a separate superheater or anything else. The steam yacht *Revolution*, built by Chas. L. Seabury & Co., Morris Heights, New York city, and which is equipped with Curtis marine turbines, has, by the adoption of a pair of Roberts safety water tube boilers increased her speed and other results to the extent that she is now a success. The Roberts boilers deliver sufficient highly superheated invisible steam, with a forced draft equaling 4 in. of water, to the turbines, to enable them to increase the speed of the vessel from 17½ miles to over 21 miles an hour, while last year the former speed was only obtainable for short periods with 5 in. of forced draft. The old boilers and the new occupy almost exactly the same cubical space and weigh practically the same.

The new stone dry dock at the Charlestown navy yard will be ready for service during the present month. It is one of the most capacious docks owned by the government and its pumping machinery is especially complete. It comprises two 48-in. centrifugal pumps each with a capacity of 65,000 gallons of water per minute and each driven by a 500 H. P. electric motor. Two 8-ft. suction pipes lead from the well on to the new dock and the other to the old dry dock. The new dock is built of New Hampshire granite laid on a solid concrete foundation.

W. A. Boole & Son of Alameda, Cal., have received the contract for the construction of a fumigating barge for the federal quarantine station at Angel Island, bay of San Francisco. The barge is to be 130 ft long, 30.7 beam and 7 ft. deep. She will be fitted with modern appliances for fumigating the holds and cabins of ocean steamers, and will cost about \$10,000. The fumigating plant on the hulk *Omaha* will be used for fumigating small craft, such as may safely be brought alongside the old vessel.



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VOL. XXXI.

CLEVELAND, O., MARCH 9, 1905.

No. 10.

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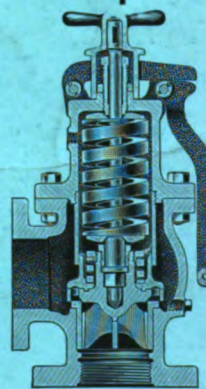
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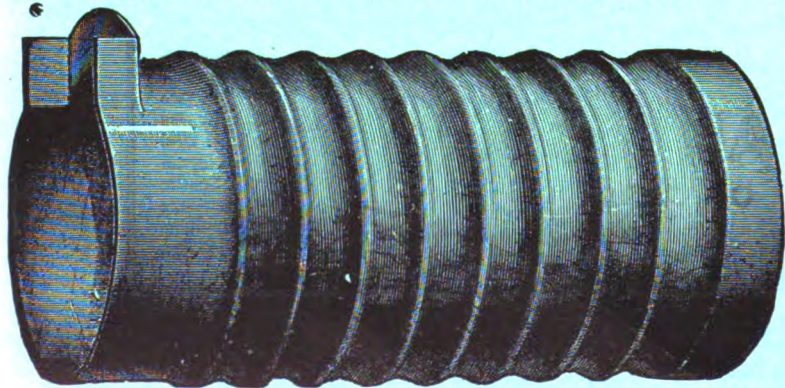
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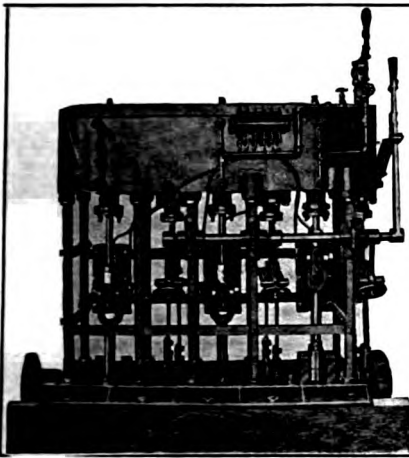
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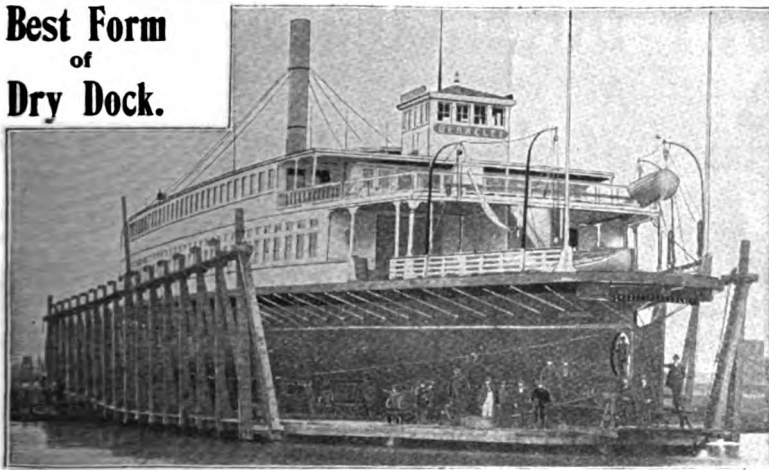
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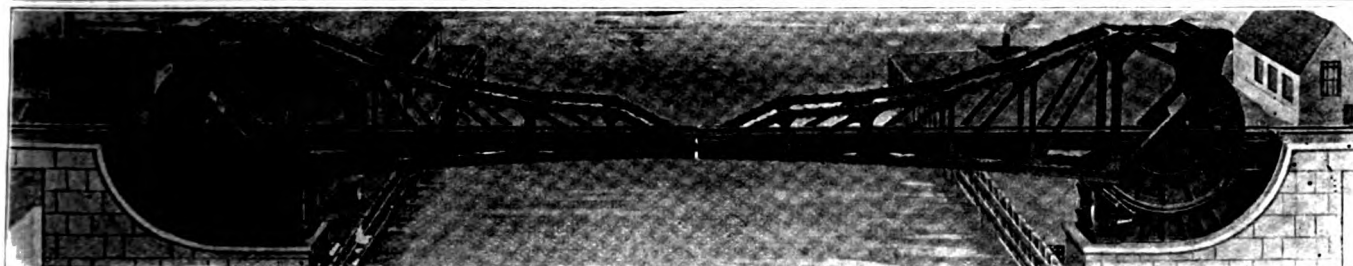
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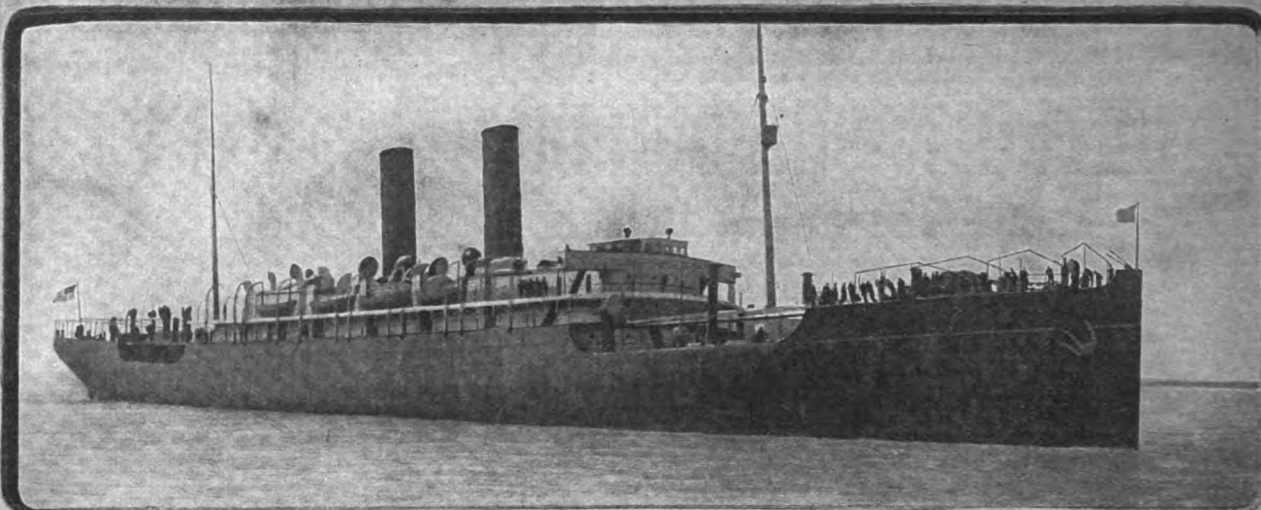
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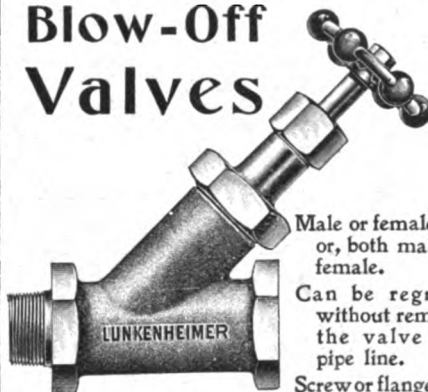
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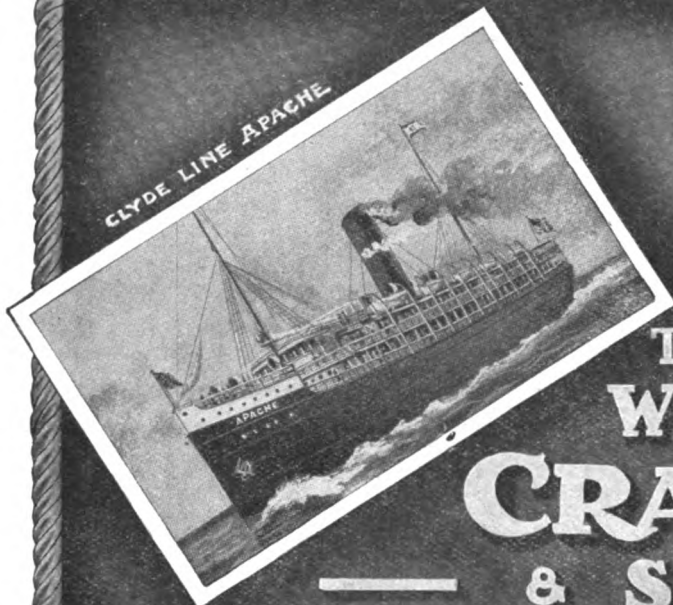
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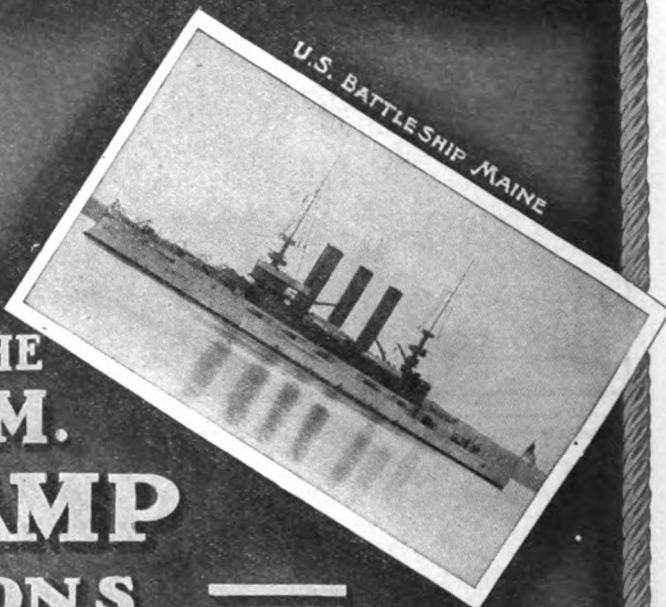
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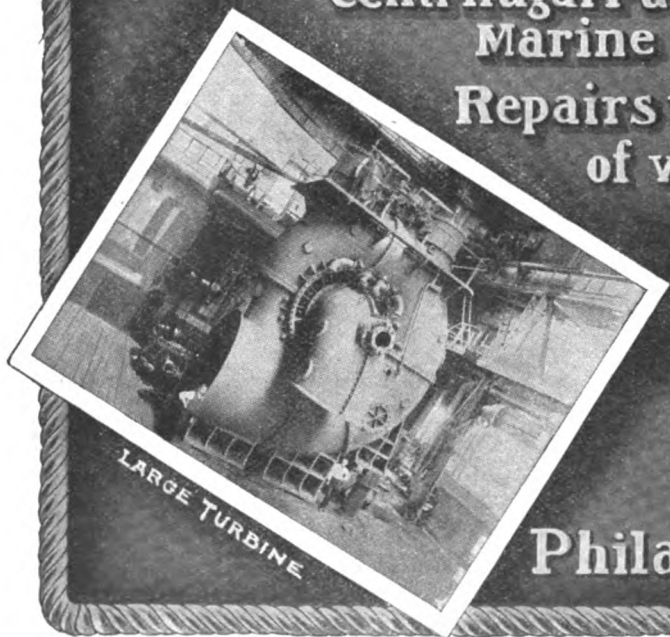
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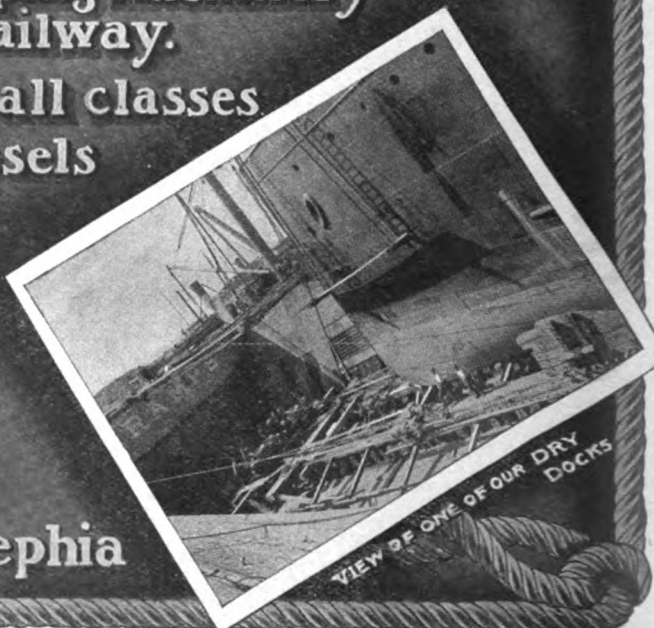
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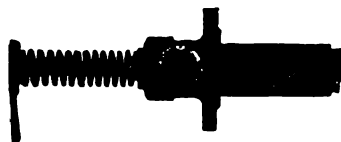
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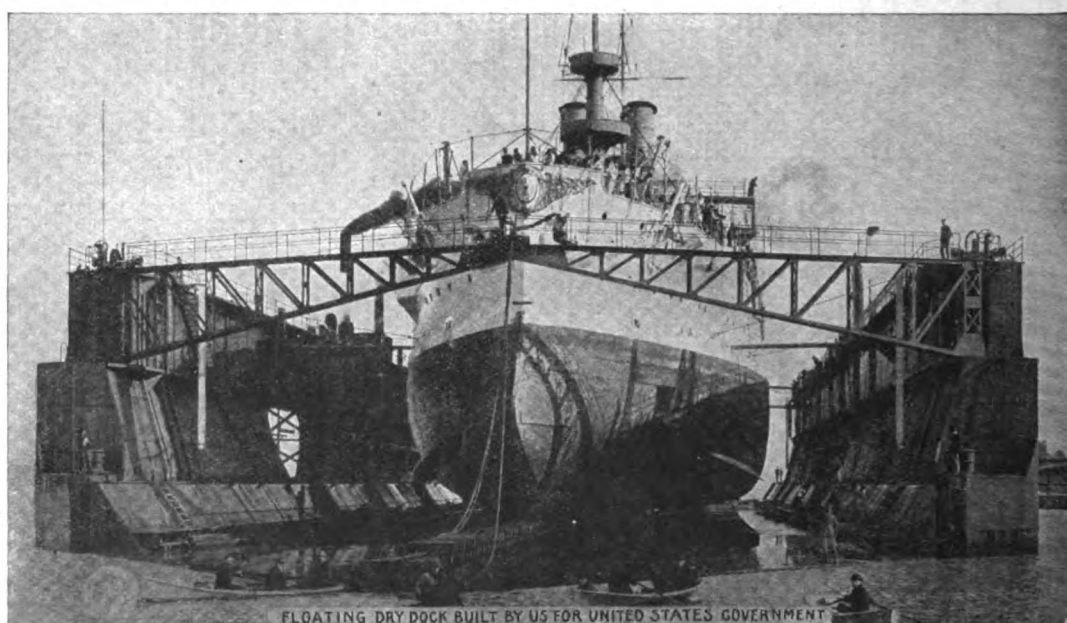
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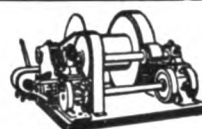
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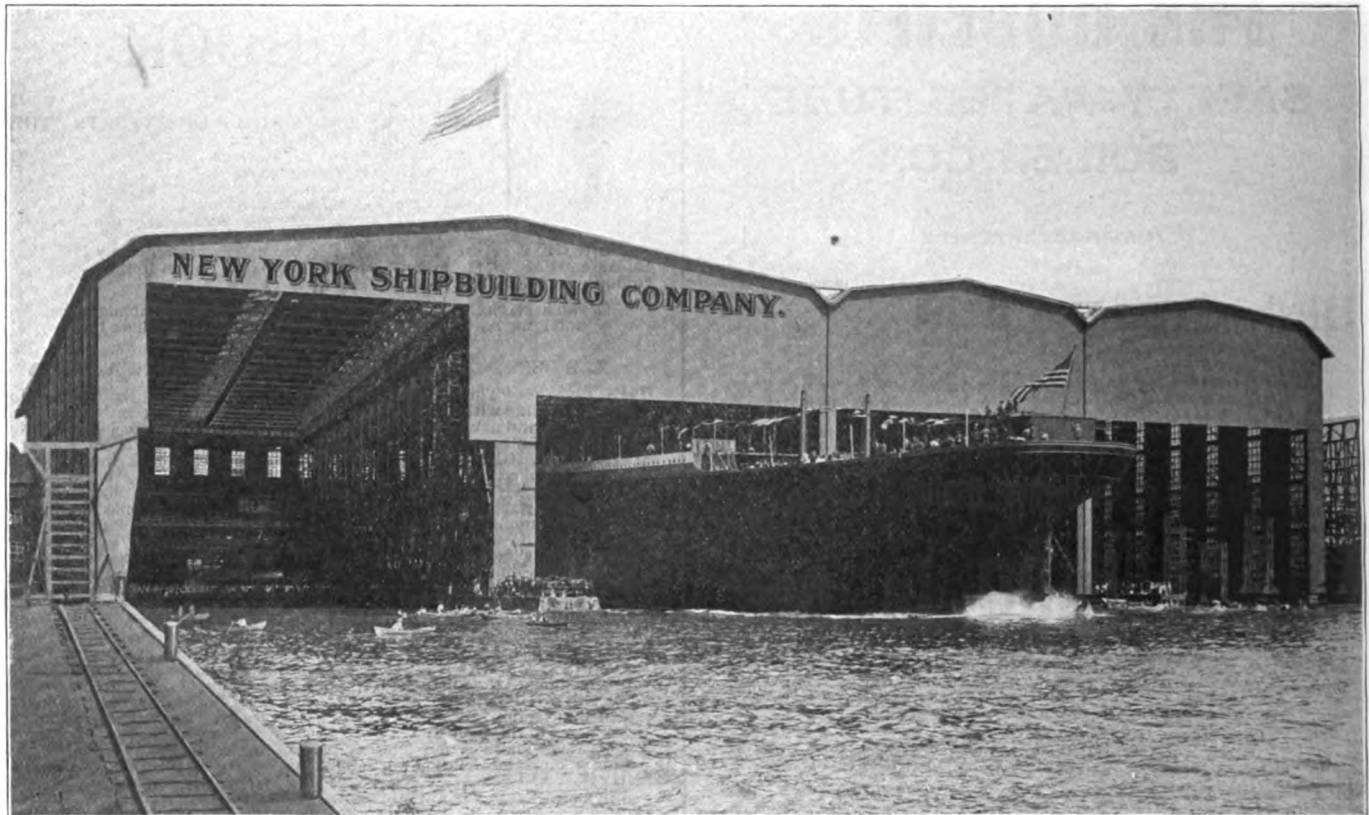
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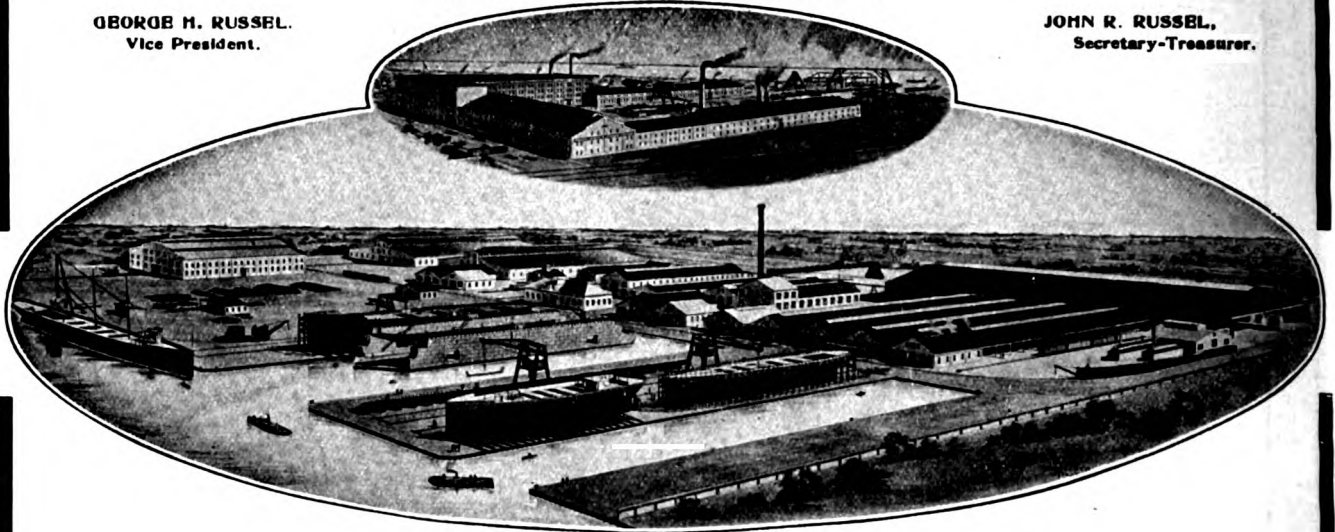
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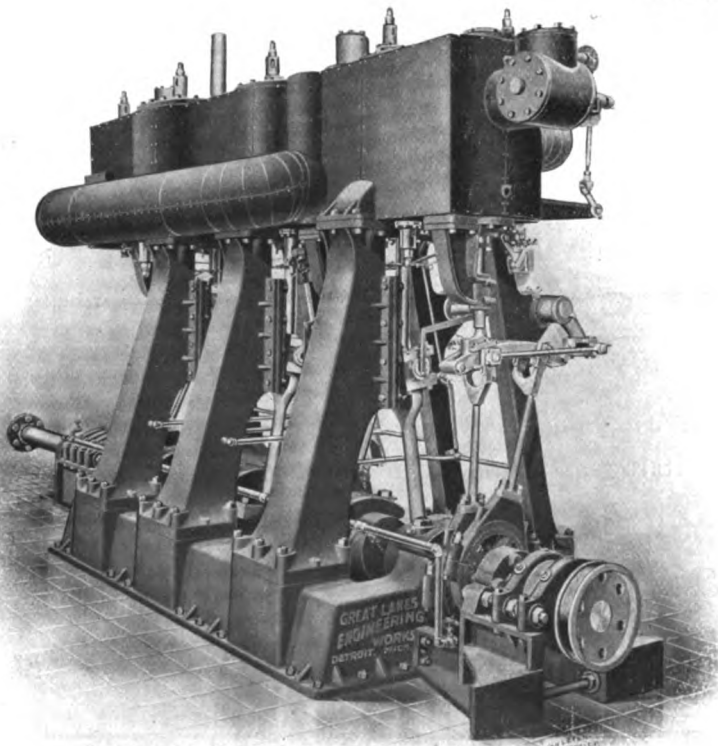
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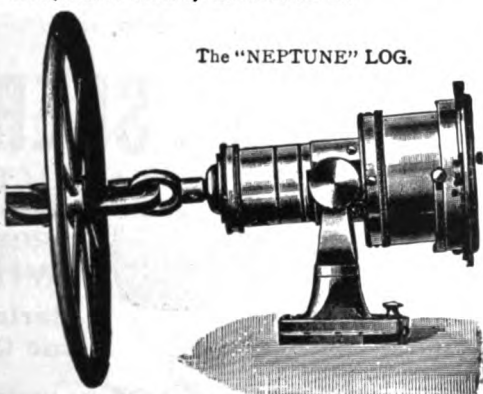
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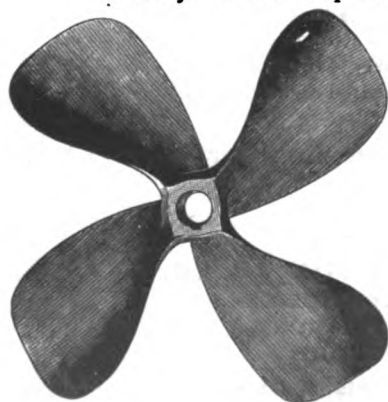
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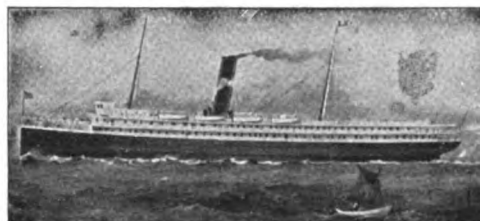
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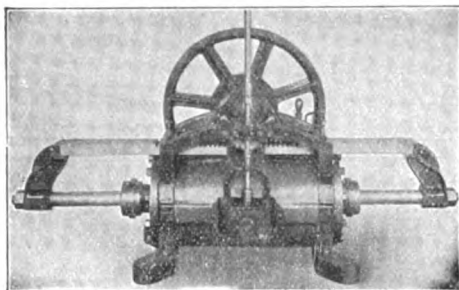
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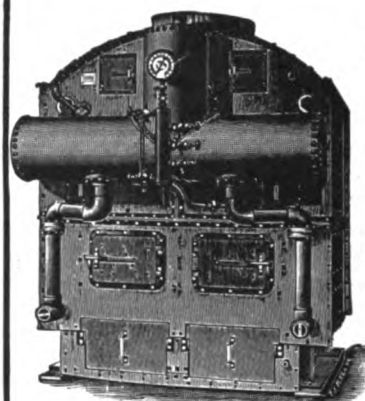
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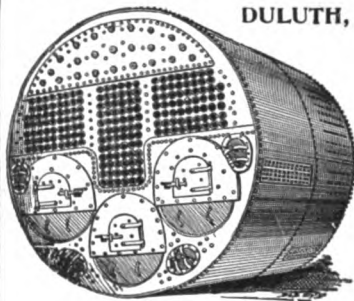
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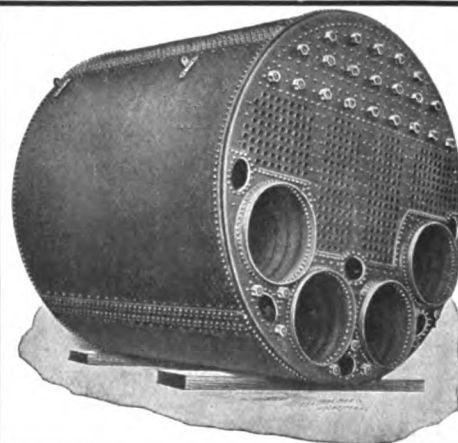
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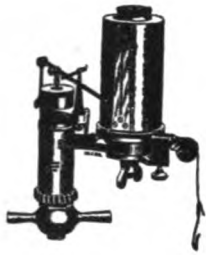


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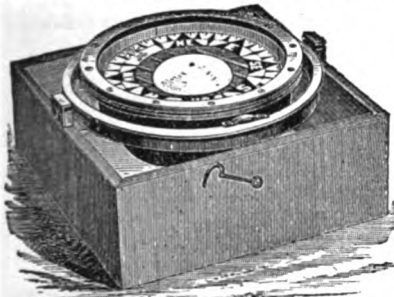
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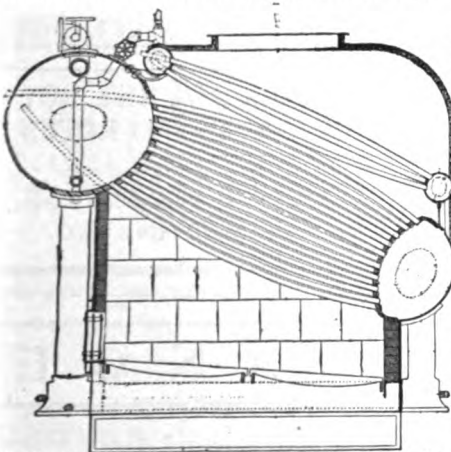
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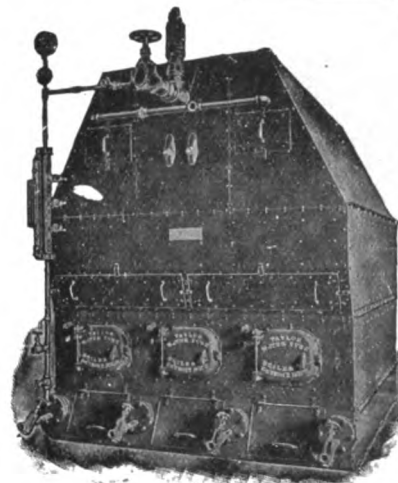
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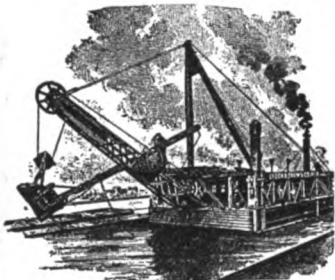
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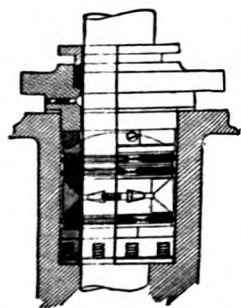
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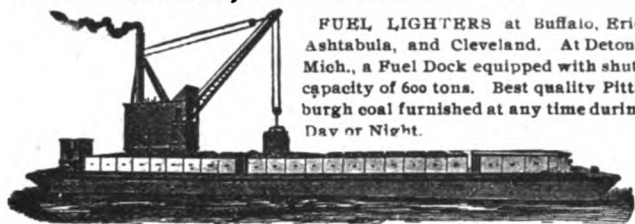
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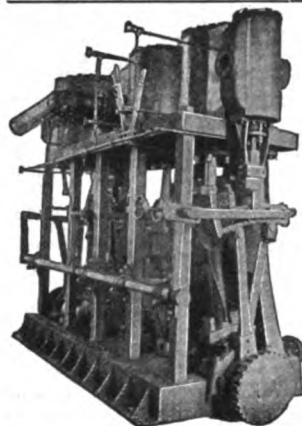
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See accompanying index of Advertisers for full addresses of concerns in this directory.

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Great Lakes Engineering Works.....Detroit.  
Mietz, Aug. ....New York.

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Marine Construction & D. D. Co.....Chicago.  
Mariner's Harbor, S. I., N. Y.  
Truscott Boat Mfg. Co.....St. Joseph, Mich.  
Willard, Chas. P. & Co. Winthrop Harbor, Ill.

**BOILER CLEANING DEVICE.**  
Power Specialty Co.....Detroit.

**BOILER COMPOUNDS.**  
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American Ship Building Co.....Cleveland.  
Atlantic Works.....East Boston, Mass.  
Babcock & Wilcox Co.....New York.  
Bertram Engine Works Co., Ltd. ....Toronto, Can.  
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Cramp, Wm. & Sons.....Philadelphia.  
Dearing Water Tube Boiler Co.....Detroit.  
Delauney, Belleville & Co., St. Denis, France.  
Detroit Ship Building Co.....Detroit.  
Fletcher, W. A. & Co.....Hoboken, N. J.  
Fore River Shipbuilding Co.....Quincy, Mass.  
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Great Lakes Engineering Works.....Detroit.

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Marine Iron Works.....Chicago.  
Maryland Steel Co.....Sparrows Point, Md.  
Milwaukee Dry Dock Co.....Milwaukee.  
Mosher Water Tube Boiler Co.....New York.  
Newport News Ship Building Co.....Newport News, Va.  
New York Shipbuilding Co.....Camden, N. J.  
Northwestern Steam Boiler & Mfg. Co.....Duluth, Minn.  
Roberts Safety Water Tube Boiler Co.....New York.  
Stirling, The Co.....Chicago.  
Superior Ship Building Co.....Superior, Wis.  
Taylor Water Tube Boiler Co.....Detroit.  
Willard, Chas. P. & Co., Winthrop Harbor, Ill.

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Bourne-Fuller Co.....Cleveland.

**BOILER STAYBOLTS, IRON OR STEEL, HOLLOW OR SOLID.**  
Falls Hollow Staybolt Co., Cuyahoga Falls, O.

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Reading Iron Co.....Reading, Pa.

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Cramp, Wm. & Sons.....Philadelphia.  
Fore River Ship & Engine Co., Quincy, Mass.  
Great Lakes Engineering Works.....Detroit.  
Lunkenheimer Co.....Cincinnati.  
Macbeth Iron Co.....Cleveland.  
Victor Metals Co.....Braintree, Mass.

**BRIDGES, BUILDERS OF.**  
Cowing, John P.....Cleveland.  
Scherzer Rolling Lift Bridge Co.....Chicago.

**BROOMS.**  
Perfection Broom Co.....Indianapolis, Ind.

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McMyler Mfg. Co.....Cleveland.

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"Long Arm" System Co.....Cleveland.

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Upson-Walton Co.....Cleveland.

**CAPSTANS.**  
American Ship Windlass Co., Providence, R. I.  
Hyde Windlass Co.....Bath, Me.  
Marine Mfg. & Supply Co.....New York.

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Smooth-On Mfg. Co.....Jersey City, N. J.

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Brown Hoisting Machinery Co. (Inc.)....Cleveland.  
General Electric Co.....Schenectady, N. Y.  
Westinghouse Electric & Mfg. Co.....Pittsburg, Pa.

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**CONDENSORS.**  
Great Lakes Engineering Works.....Detroit.  
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Dunbar & Sullivan Dredging Co.....Buffalo.  
Fitz-Simons & Connell Co.....Chicago.  
Hickler Bros.....Sault Ste. Marie, Mich.  
Lake Superior Contracting & Dredging Co.....Duluth, Minn.  
Smith Co., L. P. & J. A.....Cleveland.  
Starke Dredge & Dock Co., C. H. Milwaukee.  
Sullivan, M.....Detroit.

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Upson-Walton Co.....Cleveland.

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McMyler Mfg. Co.....Cleveland.

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Schrader's Son, A.....New York.

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Chicago Ship Building Co.....Chicago.  
Craig Ship Building Co.....Toledo, O.  
Cramp, Wm. & Sons.....Philadelphia.  
Detroit Ship Building Co.....Detroit.  
Great Lakes Engineering Works.....Detroit.  
Lockwood Mfg. Co.....East Boston, Mass.  
Milwaukee Dry Dock Co.....Milwaukee.  
Newport News Ship Building Co.....Newport News, Va.  
Shipowners Dry Dock Co.....Chicago.  
Superior Ship Building Co.....Superior, Wis.

## Buyers' Directory of the Marine Trade.—Continued.

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Westinghouse Electric & Mfg. Co. ....  
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Thropp & Sons, John E. .... Trenton, N. J.  
Westinghouse Electric & Mfg. Co. ....  
..... Pittsburgh, Pa.

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Atlantic Works .... East Boston, Mass.  
Bertram Engine Works Co., Ltd. ....  
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Chicago Ship Building Co. .... Chicago.  
Chase Machine Co. .... Cleveland.  
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Craig Ship Building Co. .... Toledo, O.  
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Detroit Ship Building Co. .... Detroit.  
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Fore River Shipbuilding Co. .... Quincy, Mass.  
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Roach's Ship Yard .... Chester, Pa.  
Sheriffs Mfg. Co. .... Milwaukee.  
Superior Ship Building Co. .... Superior, Wis.  
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Wood, W. J. .... Chicago.

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Westinghouse Electric & Mfg. Co. ....  
..... Pittsburgh, Pa.

**FORGES.**

Sturtevant, B. F. Co. .... Boston.

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Macheth Iron Co. .... Cleveland.

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Sturtevant Co., B. F. .... Hyde Park, Mass.

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Smith Coal & Dock Co., Stanley B. Toledo, O.

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Ashton Valve Co. .... Boston.  
Lunkenheimer Co. .... Cincinnati.

**GAUGES, WATER.**

Bonner & Co., Wm. T. .... Boston.  
Lunkenheimer Co. .... Cincinnati, O.

**GRAPHITE.**

Dixon Crucible Co., Joseph. Jersey City, N. J.

**HAMMERS, STEAM.**

Chase Machine Co. .... Cleveland.

**HATCH COVERS.**

American Canvas & Tarpaulin Corp. .... Buffalo.

**HEATING APPARATUS.**

Sturtevant, B. F. Co. .... Hyde Park, Mass.

**HOISTS FOR CARGO, ETC.**

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Brown Hoisting Machinery Co. (Inc.) ....  
..... Cleveland.  
Chase Machine Co. .... Cleveland.  
General Electric Co. .... New York.  
Georgian Bay Engineering Works ....  
..... Midland, Ont.  
Hyde Windlass Co. .... Bath, Me.  
McMyler Mfg. Co. .... Cleveland.  
Marine Iron Co. .... Bay City.  
Mietz, Aug. .... New York.  
Westinghouse Electric & Mfg. Co. ....  
..... Pittsburgh, Pa.

**HOLLOW STAYBOLT IRON.**

Falls Hollow Staybolt Co. .... Cuyahoga Falls, O.

**HOSE, RUBBER.**

New York Belting & Packing Co. .... New York.

**HYDRAULIC DREDGES.**

Great Lakes Engineering Works .... Detroit.

**HYDRAULIC TOOLS.**

Watson-Stillman Co., The. .... New York.

**ICE MACHINERY.**

Great Lakes Engineering Works .... Detroit.  
Roelker, H. B. .... New York.

**INDICATORS FOR STEAM ENGINES.**

American Steam Gauge Co. .... Boston.  
Ashton Valve Co. .... Boston.

**INJECTORS.**

American Injector Co. .... Detroit.  
Crane Co. .... Chicago.  
Jenkins Bros. .... New York.  
Lunkenheimer Co. .... Cincinnati.  
Penberthy Injector Co. .... Detroit, Mich.

**INSURANCE, MARINE.**

Elphicke, C. W. & Co. .... Chicago.  
Fleming & Co., E. J. .... Chicago.

**INSURANCE, MARINE—Continued.**

Gilchrist & Co., C. P. .... Cleveland.  
Hawgood & Co., W. A. .... Cleveland.  
Helm & Co., D. T. .... Duluth.  
Hutchinson & Co. .... Cleveland.  
McCarthy, T. R. .... Montreal.  
McCurdy, Geo. L. .... Chicago.  
Mitchell & Co. .... Cleveland.  
Parker Bros. Co., Ltd. .... Detroit.  
Peck, Chas. E. & W. F. .... New York & Chicago.  
Prindiville & Co. .... Chicago.  
Richardson, W. C. .... Cleveland.  
Sullivan, D. & Co. .... Chicago.

**IRON CASTINGS.**

Reading Iron Co. .... Reading, Pa.

**IRON ORE AND PIG IRON.**

Bourne-Fuller Co. .... Cleveland, O.  
Hanna, M. A. & Co. .... Cleveland.  
Pickands, Mather & Co. .... Cleveland.  
Reading Iron Co. .... Reading, Pa.

**LAMPS, INCANDESCENT.**

Westinghouse Elec. & Mfg. Co. .... Pittsburgh, Pa.  
Sawyer-Man Electric Co. .... Pittsburgh, Pa.

**LAUNCHES—STEAM, NAPHTHA, ELECTRIC.**

Georgian Bay Engineering Works ....  
..... Midland, Ont.  
Marine Iron Works .... Chicago.  
Truscott Boat Mfg. Co. .... St. Joseph, Mich.  
Willard, Chas. P. .... Winthrop Harbor, Ill.

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Drein, Thos. & Son. .... Wilmington, Del.  
Kahnweiler's Sons, D. .... New York.

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**LUBRICATING GRAPHITE.**

Dixon Crucible Co., Joseph. Jersey City, N. J.

**LUBRICATORS.**

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Lunkenheimer Co. .... Cincinnati.

**LUMBER.**

Martin-Barriss Co. .... Cleveland.

**MACHINISTS.**

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Hickler Bros. .... Sault Ste. Marie, Mich.  
Lockwood Mfg. Co. .... East Boston, Mass.

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**MARINE RAILWAYS.**

Hickler Bros. .... Sault Ste. Marie, Mich.

**MARINE RAILWAYS, BUILDERS OF.**

Crandall & Son, H. I. .... East Boston, Mass.

**MATTRESSES, CUSHIONS, BEDDING.**

Fogg, M. W. .... New York.

**MECHANICAL DRAFT FOR BOILERS.**

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Detroit Ship Building Co. .... Detroit.  
Great Lakes Engineering Works .... Detroit.  
Sturtevant, B. F. Co. .... Hyde Park, Mass.

**METALLIC PACKING.**

Katzenstein, L. & Co. .... New York.

**METAL POLISH.**

Bertram's Oil Polish Co. .... Boston.

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General Electric Co. .... Schenectady, N. Y.  
Sturtevant, B. F. Co. .... Hyde Park, Mass.  
Westinghouse Electric & Mfg. Co. ....  
..... Pittsburgh, Pa.



## Buyers' Directory of the Marine Trade.—Continued.

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 Kreer & Parsons .....Chicago.  
 Lovejoy, H. O. ....Buffalo.  
 Matteson & Drake .....Philadelphia.  
 Mosher, Chas. D. ....New York.  
 Nacey, James .....Cleveland.  
 Rice, Henry .....Buffalo.  
 Wood, W. J. ....Chicago.

**OAKUM.**

Stratford, Oakum Co.....Jersey City, N. J.

**OIL ENGINES.**

Mietz, Aug. ....New York.

**OILS AND LUBRICANTS.**

Dixon Crucible Co., Joseph.....Jersey City, N. J.  
 Standard Oil Co.....Cleveland.

**PACKING.**

Crane Co. ....Chicago.  
 Jenkins Bros. ....New York.  
 Katzenstein, L. & Co.....New York.  
 New York Belting & Packing Co...New York.

**PACKING TOOL.**

Matteson &amp; Drake .....Philadelphia.

**PAINTS.**

Baker, Howard H. & Co.....Buffalo.  
 Carbolineum Wood Preserving Co....Milwaukee.  
 New Jersey Zinc Co.....New York.  
 Upson-Walton Co. ....Cleveland.

**PATTERN SHOP MACHINERY.**

Atlantic Works, Inc.....Philadelphia.

**PILE DRIVING AND SUBMARINE WORK.**

Buffalo Dredging Co.....Buffalo.  
 Chicago & Gt. Lakes Dredge & Dock Co...Chicago.  
 Dunbar & Sullivan Dredging Co....Buffalo.  
 Fitz-Simons & Connell Co.....Chicago.  
 Hickler Bros. ....Sault Ste. Marie, Mich.  
 Lake Superior Contracting & Dredging Co...Duluth, Minn.  
 Parker Bros. Co., Ltd.....Detroit.  
 Smith Co., L. P. & J. A.....Cleveland.  
 Starke Dredge & Dock Co., C. H....Milwaukee.  
 Sullivan, M. ....Detroit.

**PIPE, WROUGHT IRON.**

Bourne-Fuller Co.....Cleveland, O.  
 Crane Co. ....Chicago.  
 Macbeth Iron Co.....Cleveland.  
 Reading Iron Co.....Reading, Pa.

**PLANING MILL MACHINERY.**

Atlantic Works, Inc.....Philadelphia.

**PLATES—SHIP, STRUCTURAL, ETC.**

Bourne-Fuller Co.....Cleveland, O.  
 Otis Steel Co.....Cleveland.  
 Reading Iron Co .....Reading Pa

**PRESSURE REGULATORS.**

Kieley & Mueller .....New York.  
 Ross Valve Co.....Troy, N. Y.

**PROPELLER WHEELS.**

American Ship Building Co.....Cleveland.  
 Atlantic Works .....East Boston, Mass.  
 Cramp, Wm. & Sons .....Philadelphia.  
 Detroit Ship Building Co.....Detroit.  
 Fore River Shipbuilding Co.....Quincy, Mass.  
 Great Lakes Engineering Works...Detroit.  
 Hyde Windlass Co.....Bath, Me.  
 Lockwood Mfg. Co.....East Boston, Mass.  
 Marine Iron Works .....Chicago.  
 Milwaukee Dry Dock Co.....Milwaukee.  
 Newport News Ship Building Co.....Newport News, Va.  
 Roelker, H. B. ....New York.  
 Sheriffs Mfg. Co.....Milwaukee.  
 Superior Ship Building Co.....Superior, Wis.  
 Thropp & Sons Co., J. E.....Trenton, N. J.  
 Trout, H. G.....Buffalo.

**PROJECTORS, ELECTRIC.**

General Electric Co.....Schenectady, N. Y.  
 Westinghouse Electric & Mfg. Co.....Pittsburg, Pa.

**PUMPS FOR VARIOUS PURPOSES.**

Blake, Geo. F., Mfg. Co.....New York.  
 Great Lakes Engineering Works .....Detroit.  
 Marine Iron Works .....Chicago.  
 Kingsford Foundry & Machine Works...Oswego, N. Y.

**REFRIGERATING APPARATUS.**

Great Lakes Engineering Works.....Detroit.  
 Roelker, H. B. ....New York.

**REGISTER FOR CLASSIFICATION OF VESSELS.**

Great Lakes Register .....Cleveland.  
 Record of American & Foreign Shipping...New York.

**REPAIRS—ENGINE AND BOILER.**

(See also Boiler Manufacturers and Engine Builders.)  
 Georgian Bay Engineering Works.....Midland, Ont.

**RIVETS, STEEL FOR SHIPS AND BOILERS.**

Bourne-Fuller Co.....Cleveland, O.

**SAFETY VALVES.**

American Steam Gauge & Valve Mfg. Co...Boston.  
 Ashton Valve Co.....Boston.  
 Crane Co. ....Chicago.  
 Lunkenheimer Co. ....Cincinnati.

**SAIL MAKERS.**

American Canvas & Tarpaulin Corp ....Buffalo.  
 Baker, Howard H. & Co.....Buffalo.  
 Upson-Walton Co.....Cleveland.

**SALVAGE COMPANIES.**

See Wrecking Companies.

**SEARCH LIGHTS.**

General Electric Co.....Schenectady, N. Y.  
 Westinghouse Electric & Mfg. Co.....Pittsburg, Pa.

**SEARARS.**

See Punches, Rivets, and Shears.

**SHIP AND BOILER PLATES AND SHAPES.**

Bourne-Fuller Co.....Cleveland, O.  
 Otis Steel Co.....Cleveland.  
 Reading Iron Co.....Reading, Pa.

**SHIP BUILDERS.**

American Ship Building Co.....Cleveland.  
 Atlantic Works .....East Boston, Mass.  
 Bertram Engine Works Co., Ltd.Toronto, Can.  
 Buffalo Dry Dock Co.....Buffalo.  
 Cramp, Wm. & Sons .....Philadelphia.  
 Craig Ship Building Co.....Toledo, O.  
 Chicago Ship Building Co.....Chicago.  
 Detroit Ship Building Co.....Detroit.  
 Fore River Shipbuilding Co.....Quincy, Mass.  
 Great Lakes Engineering Works.....Detroit.  
 Lockwood Mfg. Co.....East Boston, Mass.  
 Maryland Steel Co.....Sparrows Point, Md.  
 Milwaukee Dry Dock Co.....Milwaukee.  
 Newport News Ship Building Co.....Newport News, Va.  
 New York Shipbuilding Co.....Camden, N. J.  
 Roach's Ship Yard .....Chester, Pa.  
 Shipowner's Dry Dock Co.....Chicago.  
 Smith & Son, Abram.....Algonac, Mich.  
 Willard, Chas. P. & Co.Winthrop Harbor, Ill.

**SHIP CHANDLERS.**

American Canvas & Tarpaulin Corp ....Buffalo.  
 Baker, Howard H. & Co.....Buffalo.  
 Marine Mfg. & Supply Co.....New York.  
 Upson-Walton Co.....Cleveland.

**SHIP DESIGNERS.**

Kidd, Joseph .....Duluth.  
 Kreer & Parsons .....Chicago.  
 Matteson & Drake .....Buffalo.  
 Rice & Lovejoy .....Buffalo.  
 Steel, Nacey & Hynd .....Cleveland.  
 Wood, W. J. ....Chicago.

**SHIP LANTERNS AND LAMPS.**

Russell &amp; Watson .....Buffalo.

**SHIP TIMBER.**

Martin-Barriass Co.....Cleveland.

**SMOOTH-ON COMPOUND, FOR REPAIRS.**

Smooth-On Mfg. Co.....Jersey City, N. J.

**STAYBOLTS, IRON OR STEEL, HOLLOW OR SOLID.**

Falls Hollow Staybolt Co., Cuyahoga Falls, O.  
 Reading Iron Co.....Reading, Pa.

**STEAM VESSELS FOR SALE.**

Gilchrist & Co., C. P. ....Cleveland.  
 Holmes, Samuel .....New York.  
 Lester, S. S. ....Quebec, Can.  
 McCarthy, T. R. ....Montreal, Can.

**STEAMSHIP LINES, PASS. AND FREIGHT.**

American Line .....New York.  
 Anchor Line .....Buffalo.  
 Boston Steamship Co.....Boston.  
 International Mercantile Marine Co.....Philadelphia.  
 New York & Cuba Mail S. S. Co.....New York.  
 Red Star Line .....New York.  
 United Fruit Co .....Boston.

**STEEL CASTINGS.**

Otis Steel Co.....Cleveland.

**STEERING APPARATUS.**

American Ship Building Co.....Cleveland.  
 Chase Machine Co.....Cleveland.  
 Detroit Ship Building Co.....Detroit.  
 Hyde Windlass Co.....Bath, Me.  
 Marine Mfg. & Supply Co.....New York.  
 Moulton Steering Engine Co.....New York.  
 Sheriffs Mfg. Co.....Milwaukee.

**SUBMARINE DIVING APPARATUS.**

Morse & Son, A. J.....Boston.  
 Schrader's Son, A.....New York.

**SURVEYORS, MARINE.**

Gaskin, Edward .....Buffalo.  
 Hynd, Alexander .....Cleveland.  
 Lovejoy, H. O. ....Buffalo.  
 Matteson & Drake .....Philadelphia.  
 Parker Bros. Co., Ltd.....Detroit.  
 Nacey, James .....Cleveland.  
 Rice, Henry .....Buffalo.  
 Steel, Adam .....Cleveland.  
 Wood, W. J. ....Chicago.

**TARPAULINS.**

American Canvas &amp; Tarpaulin Corp ....Buffalo.

**TESTS OF MATERIALS.**

Hunt, Robert W. & Co.....Chicago.  
 Lunkenheimer Co .....Cincinnati, O.

**TILING, INTERLOCKING RUBBER.**

New York Belting &amp; Packing Co...New York.

**TOOLS, METAL WORKING, FOR SHIP AND ENGINE WORKS.**

Watson-Stillman Co.....New York.

**TOOLS, WOOD WORKING.**

Atlantic Works, Inc.....Philadelphia.

**TOWING MACHINES.**

American Ship Windlass Co., Providence, R. I.  
 Chase Machine Co.....Cleveland.

**TOWING COMPANIES.**

Donnelly Salvage & Wrecking Co.....Kingston, Ont.

**TRAPS, STEAM.**

Kieley & Mueller .....New York.  
 Sturtevant Co., B. F. ....Hyde Park, Mass.

**TRUCKS.**

Boston &amp; Lockport Block Co.....Boston.

**TUBING, SEAMLESS.**

Shelby Steel Tube Co.....Pittsburg, Pa.

## Buyers' Directory of the Marine Trade.—Continued.

**VALVES, STEAM SPECIALTIES, ETC.**

American Steam Gauge & Valve Mfg. Co. .... Boston.  
 Ashton Valve Co. .... Boston.  
 Crane Co. .... Chicago.  
 Jenkins Bros. .... New York.  
 Kieley & Mueller .... New York.  
 Lunkenheimer Co. .... Cincinnati.  
 Ross Valve Co. .... Troy, N. Y.

**VALVES FOR WATER AND GAS.**

Lunkenheimer Co. .... Cincinnati.  
 Ross Valve Co. .... Troy, N. Y.

**VARNISHES.**

Detroit Varnish Co. .... Detroit.  
 Detroit White Lead Works. .... Detroit.  
 New Jersey Zinc Co. .... New York.  
 Also Ship Chandlers.

**VENTILATING APPARATUS FOR SHIPS.**

Sturtevant, B. F. Co. .... Hyde Park, Mass.

**VESSEL AND FREIGHT AGENTS.**

Boland, John J. .... Buffalo.  
 Brown & Co. .... Buffalo.  
 Elphicke, C. W. & Co. .... Chicago.  
 Fleming & Co., E. J. .... Chicago.  
 Gilchrist & Co., C. P. .... Cleveland.  
 Hall, John B. .... Buffalo.  
 Helm & Co., D. T. .... Duluth.

**VESSEL AND FREIGHT AGENTS—Con.**

Hawgood & Co., W. A. .... Cleveland.  
 Holmes, Samuel .... New York.  
 Hutchinson & Co. .... Cleveland.  
 Lester, S. S. .... Quebec, Can.  
 McCarthy, T. R. .... Montreal.  
 Mitchell & Co. .... Cleveland.  
 Parker Bros. Co., Ltd. .... Detroit.  
 Prindiville & Co. .... Chicago.  
 Richardson, W. C. .... Cleveland.  
 Sullivan, D. & Co. .... Chicago.

**WATER GAUGES.**

Bonner & Co., Wm. T. .... Boston.  
 Lunkenheimer Co. .... Cincinnati, O.

**WATERTIGHT BULKHEAD DOORS.**

"Long Arm" System Co. .... Cleveland.

**WIRE ROPE AND WIRE ROPE FITTINGS.**

Baker, H. H. & Co. .... Buffalo.  
 DeGrauw, Aymar & Co. .... New York.  
 Upson-Walton Co. .... Cleveland.

**WHISTLES, STEAM.**

American Steam Gauge & Valve Mfg. Co. .... Boston.  
 Ashton Valve Co. .... Boston.  
 Lunkenheimer Co. .... Cincinnati.

**WINDLASSES.**

American Ship Windlass Co. .... Providence, R. I.  
 American Ship Building Co. .... Cleveland.  
 Hyde Windlass Co. .... Bath, Me.  
 Marine Mfg. & Supply Co. .... New York.

**WINCHES.**

American Ship Windlass Co. .... Providence, R. I.  
 Georgian Bay Engineering Works. .... Midland, Ont.  
 Hyde Windlass Co. .... Bath, Me.

**WOOD PRESERVING PAINT.**

Carbolineum Wood Preserving Co. .... Milwaukee.

**WOOD WORKING MACHINERY.**

Atlantic Works, Inc. .... Philadelphia.

**WRECKING AND SALVAGE COMPANIES.**

Donnelly Salvage & Wrecking Co. .... Kingston, Ont.  
 Parker Bros. Co., Ltd. .... Detroit.

**YACHT AND BOAT BUILDERS.**

Bertram Engine Works Co., Ltd. .... Toronto, Can.  
 Drein, Thos. & Son. .... Wilmington, Del.  
 Georgian Bay Engineering Works. .... Midland, Ont.  
 Truscott Boat Mfg. Co. .... St. Joseph, Mich.  
 Willard, Chas. P. & Co. .... Winthrop Harbor, Ill.

**YAWLS.**

Drein, Thos. & Son. .... Wilmington, Del.

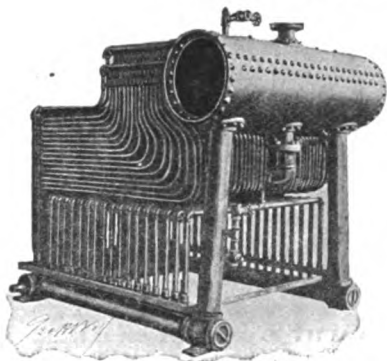
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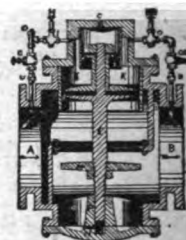
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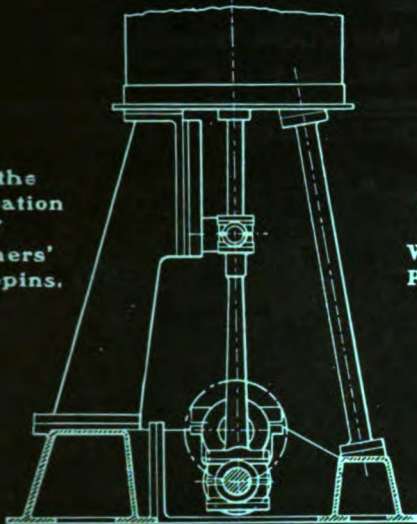
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## Sweeping Logic

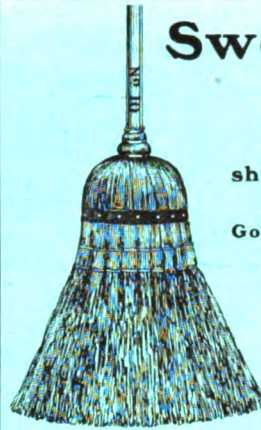
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on receipt of

**\$1.**

MARINE REVIEW,  
CLEVELAND, O.

## LAKE SHORE AND MICHIGAN SOUTHERN RY.

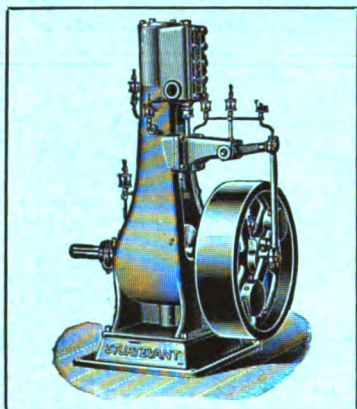
Eastward	Arrive from West	Depart East
No. 18, Southwestern Limited .....		*1:50 a.m.
No. 22, Lake Shore Limited .....	*2:12 a.m.	*2:20 a.m.
No. 20, Chicago and Cleveland Exp. ....	*7:20 a.m.	
No. 28, New York and Boston Exp. ....	*7:40 a.m.	*8:00 a.m.
No. 40, Toledo and Buffalo Accom. ....	†10:00 a.m.	†10:30 a.m.
No. 32, Fast Mail .....	*11:25 a.m.	*11:30 a.m.
No. 48, Accommodation via Sandusky .....	†1:40 p.m.	
No. 42, Boston-New York Express .....		*11:45 a.m.
No. 44, Cleveland and New York Spl. ....		*3:00 p.m.
No. 46, Southwestern Express .....		*3:10 p.m.
No. 116, Ashtabula Accommodation .....		†4:30 p.m.
No. 6, Limited Fast Mail .....	*5:40 p.m.	*5:45 p.m.
No. 26, 20th Century Limited .....	*7:40 p.m.	*7:43 p.m.
No. 10, Chicago, N.Y. & Boston Spl. ....	*7:30 p.m.	*7:50 p.m.
No. 16, New England Express .....	*10:30 p.m.	*10:35 p.m.
No. 2, Day Express .....	†9:10 p.m.	†9:25 p.m.
No. 126, Norwalk Accommodation .....	†7:55 a.m.	
Westward	Arrive from East	Depart West
No. 7, Exposition Limited .....	*12:50 a.m.	
No. 11, Southwestern Limited .....	*2:55 a.m.	
No. 9, Day Express .....		†6:00 a.m.
No. 15, Boston and Chicago Special .....	*3:10 a.m.	*3:15 a.m.
No. 19, Lake Shore Limited .....	*7:15 a.m.	*7:25 a.m.
No. 23, Western Express .....	*10:30 a.m.	*10:35 a.m.
No. 29, Southwestern Special .....	†11:10 a.m.	
No. 33, Southwestern Express .....	*12:25 p.m.	
No. 133, Cleveland and Detroit Exp. ....		*12:45 p.m.
No. 47, Accommodation .....	†11:00 a.m.	†3:00 p.m.
No. 141, Sandusky Accommodation .....		†3:10 p.m.
No. 43, Fast Mail .....	*4:35 p.m.	*4:40 p.m.
No. 127, Norwalk Accommodation .....		†5:10 p.m.
No. 37, Pacific Express .....	*6:50 p.m.	*7:20 p.m.
No. 3, Fast Mail Limited .....	*10:50 p.m.	*10:55 p.m.
No. 115, Ashtabula Accommodation .....	*8:30 a.m.	

\*Daily. †Except Sunday. ‡Except Monday.  
Trains Nos. 23, 28 and 37 run via Erie Station.  
City Ticket Office, 237 Superior St



# STURTEVANT ENGINES

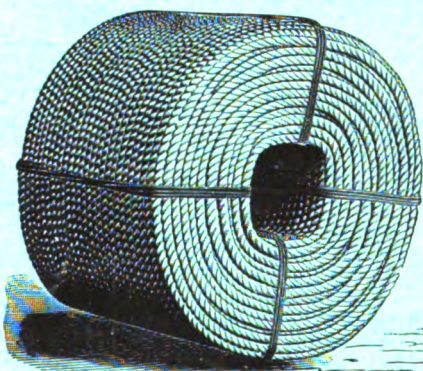
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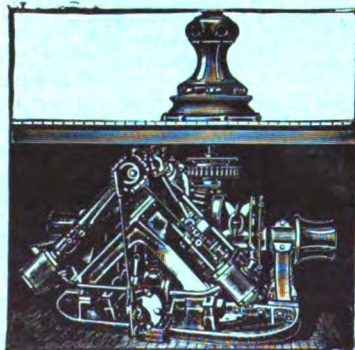
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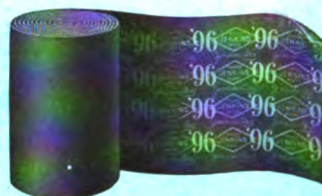
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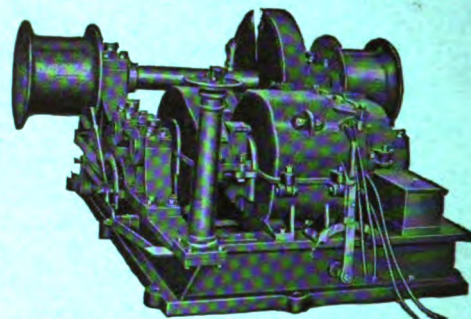
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